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ABSTRACT

The monograph reports on a model which integrates computer telecommunication technology with a social interaction approach to teach literacy skills to disabled students. The model was implemented and evaluated over a 3-year period with 91 students, 12 to 18 years of age, in 10 schools serving students who are deaf, emotionally disturbed, mentally retarded or have cerebral palsy or specific learning disabilities. The project, which focused on using the motivating power of electronic mail, had three specific research objectives: to assess changes in students' reading comprehension; to assess changes in students' competency in writing English; and to identify patterns of change in reading and writing competence through analysis of student correspondence with peers via electronic mailboxes and bulletin board. Findings indicated that: (1) participation did improve students' reading and writing abilities; (2) frequency of use was the most significant variable in student progress; (3) initial skill level was not related to program effectiveness; and (4) students who corresponded regularly with a mature writer made greater gains that students who corresponded only with peers. An analysis of results by year and by disability is provided. Appendixes provide scoring notes for the standardized reading test, the literacy aptitude questionnaire, the student and teacher evaluation questionnaires, and the training booklets for teachers. Contains 35 references. (DB)

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# TELECOMMUNICATIONS

# IN [illegible] APPROACH

# TO [illegible]

# IN DISABLED STUDENTS

DORIS M. NAIMAN
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# TELECOMMUNICATIONS AND AN INTERACTIVE APPROACH TO LITERACY IN DISABLED STUDENTS

## FINAL REPORT

**Doris W. Naiman**
**New York University**

# Foreword

What have we learned from the Project?

In the pages to follow there is a description of what we have done in the Project, the results obtained, what we have learned and what has been demonstrated.

As an important starter we have seen that present day computer technology, specifically computer telecommunication, can be used to expedite, facilitate, and make happen a complex kind of learning: writing and reading for meaning. And furthermore, we have been able to demonstrate that the technology can be integrated with the social interaction approach to literacy that has been developed widely in recent theory, research and practice.

A primary finding of the research has been that students do improve in both their writing and reading abilities with participation in the combined Project interventions. The focus has been on communicating real meaning to a real audience and on accomplishing this with the assistance of the motivating power of Electronic Mail. It has been exciting to find that it works.

Another finding of special interest in terms of its implications for practical use in education for literacy is the body of data indicating that students who have corresponded regularly with a mature and interested writer improved more than students who corresponded only with peers. Both groups have shown gains, but the effects of correspondence with the adult writer have been related to a growth in complexity of language and deepening of conceptualization.

We have found that students have improved in their reading and writing skills no matter what their level in the beginning. In other words, the Project interventions have been effective both with students who initially had poor literacy skills and those who were functioning at a much higher level. Also there has been no difference between the appeal of the Project for either group of

students. The frequency of use has been similar across initial literacy skills.

The one significant variable that regularly has made a difference in progress has been frequency of use. The students who have written and read a lot improved more than those who did not. Students have learned to read and write by actually doing so and the Project has been effective in motivating students to want to read and write.

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# Telecommunications and an Interactive Approach to Literacy in Disabled Students

# Introduction

This research Project has been designed to seek solutions to a central problem in the education of disabled students, their limited ability to read and write. The researcher has developed a conceptual model that combines and brings to bear on the problem two major areas of recent development in technology and theory. The Project model utilizes electronic communication in a way that is consistent with current theory and practice in literacy development as an interactive process.

The model has been implemented and evaluated in ten schools serving students who are deaf, emotionally disturbed, mentally retarded or have cerebral palsy or specific learning disabilities. The Project involved 91 students, 12 to 18 years of age. Each school provided two teachers and approximately ten students. Cooperating teachers received ongoing instruction and assistance from Project staff members in both the use of telecommunications and the theory and methods of providing a functional reading and writing environment to foster maximum growth in literacy.

Equipment and telecommunication services provided by Telenet included installation of Electronic Mailboxes for all the students in the Project, establishment of an Electronic Bulletin Board, establishment of a Computer Teleconferencing System that enabled the researcher, the Advisory Committee specialists and the cooperating teachers to have ongoing dialogue with each other, and free on-line time for Project use.

A distinguished group of special education and literacy specialists, serving as an Advisory Committee for the Project, assisted the researcher and the teachers in responding effectively to new developments as they happened and deepened the

linkages to the broader fields of special education, literacy acquisition and telecommunications, and bringing to the Project insights from these fields and disseminating research findings back to them.

# Background Information

## The Need

How to increase the present low level of competency in reading and writing English is a central and severe problem in the education of disabled students. The customary formal methods of teaching reading and writing skills have not been successful with most such students. Rehabilitation counselors report regularly that their clients' inability to read and write well enough to follow simple directions or even fill in job application forms is a serious detriment to their employability and even to their capacity for independent living. There clearly is a critical need for research that utilizes new technologies, theory and practices to help solve this stubborn and difficult problem.

The latest data from the Center for Assessment and Demographic Studies at Gallaudet College (Schildrath, 1984) indicate that 16 year old students enrolled in schools for the deaf in the United States have a median score of 3.4 grade level on the Paragraph Meaning subtest of the Stanford Achievement test. This is equivalent to a reading age of nine and one-half years. Progress before 16 years of age is slow and the median score for 12 year olds is 2.4, an increase of only one grade level in the four year period. Progress after 16 years of age is almost non-existent. The median scores for 17 and 18 year olds is 3.5.

The Paragraph Meaning subtest is essentially a test of ability to understand connected prose and is generally considered a measure of reading comprehension. Although reading tests differ and do not necessarily tap the same linguistic abilities, and no single definition of reading is likely to find global acceptance, reports from other surveys are similar to the one reported above. Twenty years ago Wrightstone, Aranow and Moskowitz (1963), using the Metropolitan Achievement Tests with more than 5,000 deaf students in 73 schools throughout the United States,

reported a median grade of 3.4 for 15 1/2 to 16 1/2 year olds. Reports by Conrad (1979) on all deaf school leavers of 15 1/2 to 16 1/2 years old in England and Wales provide comparable data.

Special educators working with other types of handicapped students report similar difficulties in helping their students develop functional reading and writing skills. Guthrie and Cunningham (1982) indicate that functional literacy, as a right of all children, is attainable by educable mentally handicapped children, but that currently used approaches are only partially effective. Languetot (1984) indicates that in teaching autistic children to be taught to read with comprehension, it is imperative that there be new approaches to achieve this. Wolff, Desberg and Marsh (1985) discuss the need for new strategies to help students with learning abilities increase their literacy skills.

## Theoretic Rationale

Literacy as an interactive process approach to reading and writing is based on the understanding of literacy as communicative competence in *using* written language. This means competence in the personal and social use of reading and writing as well as the form. The approach involves both the comprehension of written information and the expression of one's experience and intentions in writing to accomplish personally meaningful goals. Students' self-selected topics are used rather than assigned ones, and the purpose is always to communicate and understand, never to evaluate (Staton, 1981).

Principles of modern composition theory recognize that the acquisition of literacy is possible only when students are given a supportive context wherein they are communicating something they really want to say to someone who genuinely wants to hear it, and when students are receiving constant feedback to monitor their attempts to convey meaning (Graves, 1975; Sommers, 1982). An electronic network offers students the opportunity to pursue the acquisition of literacy in these ways by enabling them to write to an audience interested in what they have to say, and to receive immediate and direct feedback about their written communication.

The electronic network provided students with an interested audience of other persons, thereby creating a public forum via Electronic Mailbox letter writing and an Electronic Bulletin Board for the exchange of experiences, the posing of questions, and the testing out of language. By putting students in com-

munication with supportive adults who wanted to exchange meaning with them via letters as well, the network allowed the means by which requests for clarification and elaboration could be directly rendered. Most important, the network offered students a more diverse linguistic community than that afforded them within classroom environments. All of this created a real motive for sustained reading and writing practice. Since these capabilities form the foundation for and are prerequisites to the development of literacy, the network provided the means by which students could make strides in the pursuit of literacy.

The Electronic Bulletin Board has been modeled from aspects of the Computer Chronicle Newswire, which was developed at the Laboratory of Human Cognition, University of California, San Diego (Lewis, Boruta and Vasconcellos, 1983). To counter a decontextualized approach to writing, the Newswire provided an audience for information exchange. It created a functional reading and writing environment in which students could read and write for communication purposes instead of for teacher evaluation. The network made it possible for students who knew nothing about each other personally to exchange information about their daily life and ideas. As reported by Riel (1983), students on the Computer Chronicle Newswire came to realize that the differences among them made it important for them to write good descriptive accounts, and they felt the influence of having an audience they wanted to reach. As students continued to write for the Newswire their attitude toward writing changed and they became more confident in their ability to express themselves, gaining a better understanding of the need for elaboration and full description. The Newswire made students' concern with the mechanics of writing secondary to, but instrumental for, communicating clearly.

Our students needed their teachers' assistance in the expansion and revision of their news for the Electronic Bulletin Board. The teacher's goal was always on helping the student express his own ideas, but it was essential that the student have the teacher's help to foster his growth in being able to express himself in writing. Through questions and modeling, and without criticism and corrections, the teacher helped expand the student's ability to both understand the written word and to use it more adequately himself.

## Background Research

Although there have been many projects in schools involving the use of computers, there are few instances where electronic mail has been used as a major medium of communication.

A study done by the Alternative Media Center, New York University (1982), focused on the personal use of computers by developmentally disabled persons for their own enrichment at their own pace. Apple computers were placed in the homes of eight teenagers and young adults who had varying degrees of mobility impairment due to cerebral palsy. Although the study was devoted to educational and vocational activities, an electronic bulletin board was set up to allow and facilitate interaction between the instructors and the students. The study reports that the bulletin board was used for verifying appointments with tutors, reporting equipment problems and for social dialogue. The electronic bulletin board was accessible to other home computer users and the Alternative Media Center staff, but there was very little use between the participants and outside users.

Bradley (1982) reports that when electronic mail was installed in a school for the deaf, it became the most popular computer lesson in the school. The study by Rubenstein and Rollins (1978) further reports that 40 students who had a history of being reluctant to do any writing, wrote more than 1500 letters to each other during the year using a system developed by Bolt, Beranek and Newman. Bradley also reports a plan at University of California at San Diego (Kleiman and Humphrey, 1982) to install an electronic mail system between schools in California and Alaska to allow for student to student communication.

In 1982, GTE established Teencom, an experimental teleconference among teenagers at the Model Secondary School for the Deaf in Washington D.C. and hearing teenagers at Framington, Massachusetts and Towanda, Pennsylvania. The teleconference was mediated by a computer at GTE Laboratories, Waltham, Massachusetts. Teencom was an ongoing conversation; participants could sign on to the computer from any location at any time, review the recent conversation and add messages. The conversation was saved for review by the participant and from time to time participants were sent a printout containing all of the public messages. Participants could also "whisper" to each other. That is, they could send a message that would be seen only by the party to whom it was addressed and would be erased as soon as

received. There was a heavy traffic in "whispers" as well as in public messages.

In 1980, Edward Housman of GTE Laboratories, with the assistance of Brenda Monene as a consultant, established an international network for deaf people using electronic mail. The focus of the effort was with schools of the deaf in the United States and the United Kingdom. A plan was conceived to establish the network of schools first in the United States and then in England to allow the two groups to send messages to each other from their own systems (Mailstream in the U.K. and Deafnet on GTE Telemail in the U.S.). Two residential programs and one mainstreamed program for the deaf were selected for the United States group and were given terminals and computer time on Deafnet. The students were encouraged to communicate on a pen pal basis using both private mailboxes and bulletin boards for general information passing between the schools. They were also given access to the national DCI Deafnet group.

Last year, a message was sent to GTE employees via their bulletin board, telling of the New York University Project and inviting anyone who had an interest in communicating with the deaf students, to send a short message about themselves to the Schools Bulletin Board. Employees were instructed to give a short description of their job, hobbies or special interests and invite the students to be pen pals. The response from the employees was immediate. Within a seven day period a total of 45 messages were sent to the Schools Bulletin Board from secretaries, engineers, scientists in the United States, Canada and Israel. The introduction of the employee/student program gave the students a chance to interact with persons they would normally not have had the chance to meet, or having met, would have needed to overcome intractable communication barriers in order to ask the questions they had in mind. With electronic mail, the speech barriers were down, the formality was gone and relationships that would not normally happen were happening. Students had the opportunity to explore life with the employees at their jobs and indeed in other countries.

During the year immediately preceding the commencement of the Project, the Project director implemented, fieldtested and evaluated the Project model with the support of a Distinguished Professor Research Award from the National Institute of Handicapped Research. The model was implemented in five schools for deaf children. Major Project materials, assessment, instru-

ments and procedures were fieldtested and evaluated that year and revised to accommodate the needs of the broad range of handicapped children.

## Objectives

The overall objective of the Project has been to investigate the effectiveness of the use of telecommunications combined with an interactive process approach to literacy in improving the reading comprehension and written English skills of disabled students.

Specific research objectives have been:

- To assess changes in students' reading comprehension after three years of participation in the program.
- To assess changes in students' competency in writing English after three years of participation in the program.
- To analyze student correspondence with peers via Electronic Mailboxes and the Bulletin Board in order to identify and describe patterns of change in reading and writing competence.

## The Sample

The research Project included 91 disabled students, 12 to 18 years of age. There were approximately ten students from each of the ten schools.

Schools were selected in regard to the following considerations:

- Necessity that the selected schools included the range of disabled students who represented the target population for whom the approach was intended.
- Interest of the school administration in the conceptual approach and goals of the Project and a commitment to full participation. Since this was a complex Project it was essential to have full understanding and commitment from the superintendent or principal.
- Variety in types of schools and settings. In order that the findings of the research Project be as

generalizable as possible it was desirable that Project staff members dealt with the wide variety of problems that occurred in real life situations as differentiated from a carefully controlled laboratory setting. Schools were selected to include many types of settings: public and private, urban and rural, mainstreamed and self contained.

- Geographic location. In order to expedite travel for Project staff in demonstrating and training in use of the Project telecommunications, it was necessary that schools be located in the northeastern region of the country.

The following schools have participated in the Project.

- Association for the Help of Retarded Children - Bayside, NY
- Board of Cooperative Educational Services, Colonie Central High School - Albany, NY
- Board of Cooperative Educational Services, Guilderland Center High School - Guilderland Center, NY
- Clarke School for the Deaf - Northampton, MA
- Lexington School for the Deaf - Jackson Heights, NY
- Livingston High School - New York, NY
- Manhattan Occupational Training Center - New York, NY
- Horace Mann school for the Deaf - Allston, MA
- New York School for the Deaf - White Plains, NY
- United Cerebral Palsy of Queens, Inc. - Jamaica, NY

Two classrooms teachers at each school were selected by the school administrator. The cooperating teachers had indicated their interest and intent to participate in all aspects of the evaluation and implementation of the Project. This included the teacher training activities related both to telecommunications and to the social interaction approach to literacy.

The ten students from each school were ones who already had been assigned to the classrooms of cooperating teachers or to a resource room situation that allowed for extensive daily contact with those teachers. Since the goal of the research was to evaluate the effectiveness of the approaches with a wide range of students,

all of the students in the teachers' regular classes were accepted as subjects in the research Project.

Information was gathered regarding student's I.Q. scores, educational backgrounds, hearing loss, presence of other disabilities and communication skills in various modes. This information, while not being used as criteria for acceptance as subjects, was useful in providing data for analyzing which students are more likely to benefit in various ways from the interventions.

Permission slips were signed by parents allowing the researchers access to the students' writing for purposes of analysis.

## Telecommunication Equipment and Services

Telenet supplied the telecommunication equipment, on-line usage time and technical assistance for the three years of the Project. Equipment and services provided included:

- Computer terminals in each classroom, at New York University and at the office or home of each Advisory Committee member.
- Individual Electronic Mailboxes for each student, teacher, Project member, and Advisory Committee member.
- Electronic School Bulletin Board.
- Computer Teleconference System for interaction among teachers, Advisory Committee members and Project staff members.
- Computer program and facilities for analysis of large quantities of written productions.
- Technical assistance.

## Activities Providing Literacy Development Experience for Students

### 1. Electronic Mailbox Correspondence

Each student had his own private Electronic Mailbox. Students were shown how to write communications to students in the other schools of the Project as well as to any individuals who were part of the DEAFNET telecommunications network. All individual letters were written and read independently by students

without involvement of teachers. Students got immediate printouts of all correspondence.

Students were able to address messages to the specific individual with whom they wished to correspond, and only that individual had access to the message, accomplished by signing in to his own private Electronic Mailbox. Students were able to send messages at any time and addressees were able to receive the messages at their own mailboxes at any time.

Electronic Mailbox communications were stored in the computer's storage system for analysis by the researcher. No one else had access to the correspondence.

### 2. Electronic Schools Bulletin Board

An Electronic Schools Bulletin Board was established the first month of the Project and described to the teacher and students at that time. Students were able to send stories, news and other communications to the Electronic Bulletin Board at any time. All of the students in the Project had access to the Electronic Bulletin Board and were able to sign in at any time to receive the communications.

The Electronic Bulletin Board component of the Project required the assistance of the teachers in helping the students expand, revise and edit what they wanted to say.

### 3. Dialogue Journal Writing Conferences

Teachers had Dialogue Journal Writing Conferences with students throughout the Project. Written communications between students and teachers were entered in the journals. The initial focus of the journals was on students' ideas and feelings about what they would like to write for the Electronic Bulletin Board. The teachers responded in writing to the students' communications and, by questioning and modeling, helped them increase their ability both to read the teachers' comments and to express in writing what they themselves wished to say.

## Activities Providing Instruction to Teachers

### 1. Teleconferences of Teachers, Project Staff and Advisory Committee

A Computer Teleconferencing System was set up the first month of the Project. The researcher, the teachers and Advisory Committee members had access to the system and were able to

participate in ongoing conversations about the concepts and activities involved in establishing a classroom environment that provides an interactive process approach to literacy. Teachers were able to bring up their problems and discuss techniques for handling them together and with the consultants.

Each member of the Teleconferencing System was able to sign on at any time, review the recent conversations, and add messages. Print-outs of the conversations were mailed regularly to participants.

### 2. Instruction and Direction to Teachers

Since the teacher's role in the Project was of crucial importance, major attention was devoted to giving materials and ongoing assistance to teachers. At the beginning of the Project in October 1985, the director visited the teachers, discussing all aspects of the program and demonstrating use of the telecommunication equipment. The director and other Project staff members provided ongoing consultation to the teachers throughout the Project both in individual conferences and by means of the Teleconference System.

During the first three months of the Project, each teacher was mailed a series of packets of written materials, which included further explanation of the theory and practice of a social interactive approach to literacy, a description of techniques for teacher responses that helped students improve their comprehension and ability to express themselves in writing, and illustrative examples. See Appendix 8 for copies of booklets.

# Presentation of the Findings

## Analysis of Tests and Questionnaires

This section of the report will present findings of the first two years of the study. The first portion will present demographic data and analysis of all tests and questionnaires administered in the Project. The second part will present a linguistic analysis of student writing.

Since this is a longitudinal study, even if for a relatively brief period in terms of what we would like, it is useful to present the study and our findings at key time points. These key points are the pre-study period, the end of the first year, and the end of the second year.

Pre-study information will set the stage for the discussion of results by detailing the demographic, disability and literacy levels of the initial study group, all of whom took part in the first year of the Project.

The first year information will detail the results at the end of one year of the study, and second year information will detail the results seen for those students who participated in both years of the study.

We are concerned with the effect that use of telecommunications and a social interactive approach to literacy, as part of this Project, have had ôn the participants' literacy abilities. To this end, we have identified measures, both objective and subjective, to show the possible change and the direction of the change that may have occurred.

There are few standardized tests or measures that are appropriate to the investigation at hand. Thus, in interpreting the results, we must not only concern ourselves with apparent changes or lack of changes, but also with the accuracy or appropriateness of the measures and how they are used. In that sense, the

results of this study should be seen as preliminary and exploratory; as pointing the way to future, more intensive investigation, rather than as definitive answers about the educational impact and potential of a particular intervention strategy for specific disability groups.

Eight sets of tests or instruments have been used:

- Standardized Test of Reading Comprehension, which deals with reading *abilities* only
- Literacy Attitude Questionnaire, which deals with *attitudes* to both reading and writing
- Student Evaluation Questionnaire which deals with *attitudes* to both reading and writing via telecommunications
- Teacher Evaluation Questionnaire, an educational professional's evaluation of reading and writing *abilities*, and with broader areas of possible impact of participation
- Holistic Scoring, which deals with writing *abilities*
- T-Unit Evaluation, which deals with writing *abilities*
- Analysis of Features, which deals with writing *abilities*
- Analysis of Forms, which deals with writing *abilities*

## Standardized Reading Tests

Each school was asked to provide for each student the scores for the reading comprehension section of a standardized nationally used test. Schools were asked to provide test results for each student prior to participation in the program, after the first period of participation (June, 1986), and after the second year's participation (June, 1987).

While the test used varied from school to school, the schools were asked to insure that individual students were tested with the same version of the test for the two post-test periods that had been given for the pre-Project period.

Tests used were:

- Stanford Diagnostic Reading Test, 2nd Edition
- Stanford Achievement Test, 7th Edition
- Stanford Achievement Test, Level Three, for Use with Hearing Impaired Students

Results from these tests are not directly comparable across the test, but that did not present a problem. We are not interested in how students in each of the disability groups compared with each other, but rather, whether we could say, on the basis of the testing, that significant change had occurred for individual students in the group. To this end, all raw scores (the number correct on each of the tests) were converted to their Normal Curve Equivalents, which allow for statistical manipulation in a manner in which raw scores, grade equivalents, stanines and percentiles do not. A fuller discussion of scoring policies and rationales for the study is given in the Appendix 1, along with the list of specific tests used by coded students.

## Literacy Attitude Questionnaire

The Literacy Attitude Questionnaire was used to measure the individual's attitude toward reading and writing. The scale used for the test is a version adapted from the Emig-King Attitude Scale for Students. The test concerns behaviors and preferences of students related to reading and writing and offers a choice of five answers for each question: almost always, often, sometimes, seldom, or almost never. The questionnaire, both in the original and as adapted for use in this study, contains separate sets of questions for reading and writing.

The revised scale was reduced to 40 items since the original 50 item scale was found to be too lengthy for some students. The items in both the original and the revised scales represent three categories: preference, perception, and process. The following are examples: preference - "I write letters to my family and friends." perception - "Good writers spend more time revising than poor writers." and process - "I voluntarily re-read and revise what I've written." Approximately 30 minutes are needed for the administration of the scale.

*Validity, Reliability and Normative Data*

The original scale was used in a 1977-1978 study of the New Jersey Writing Project. Twenty teachers and 1,600 students participated in this study. The present scale was constructed after suggested revisions were made by English Education graduate students and secondary teachers of English. The suggestions of these experts contributed to the content validity of the scale. Reliability coefficients for each category are: preference: .716 perception: .589 and process: .726 (Cronbach Alpha).

It was necessary to adapt the Emig-King Writing Attitude Scale for Students to the special needs of our Project. In doing so, the Project staff maintained the descriptive categories. Item language was simplified for readability. Reading items were added.

A different and much more adapted version was used for the small group of severly retarded students included in the study. In this case, the possible answers were limited to Yes or No and the questions themselves were fewer in number. We will not include here a discussion of the approach to this adaptation since its use was rendered moot by subsequent occurrences in the study, as detailed in the section on Frequency of Use in the Year One write-up.

A copy of the questionnaire as used in the Project is given in Appendix 2.

### Student Evaluation Questionnaire

The Student Evaluation Questionnaire is a brief set of questions relating to students' feelings about reading and writing Private Mailbox letters and Bulletin Board stories. It also attempts to determine if the public nature of Bulletin Board work influenced the importance to the student of second draft written work.

Space also was given for the student to make an open-ended comment on what he or she liked or did not like about the Private Mailboxes and the Bulletin Board.

A copy is included in Appendix 3.

### Teacher Evaluation Questionnaire

The Teacher Evaluation Questionnaire was used to provide a professional evaluation by the teacher of each student in terms of the extent to which the intervention strategy has changed the student's literacy abilities in relation to what the teacher would have expected under non-Project conditions.

The questionnaire deals not only with changes or achievements in reading and writing skills and attitudes, but also with possible changes in other areas from participation in the study. These include attitudes toward reading and writing, interactions with others, work in other academic areas, and sense of self confidence.

Although this is a subjective measurement, we considered that the experiences of the teachers who participated in the

Project and their knowledge of the previous work of the students involved allowed them to make a pertinent and useful evaluation.

A copy is included in Appendix 4.

## Pre-Study Information

Initially, 111 students, at 11 schools were participants in the Project. Within the first year, however, one school had to be eliminated because no Telenet service was available in the area.

Thus, the following analysis and presentation deals only with those schools and students who were in the study through at least the major portion of the first study year.

Ninety-one students at 10 schools fell into this category. A student was considered a participant if he or she had been on the telecommunications system at least once in the first year of the study.

### Disability Characteristics And Groupings

The participating students had a variety of physical, cognitive, and/or emotional disabilities that interfered with their learning. These disabilities fell into three basic or initial groups, and for the purpose of data analysis for the study, the students usually will be classified into these three groupings:

The Deaf group (N = 59) included all study participants who were deaf, attended special schools for the deaf, had a minimum of low average intelligence according to standard testing. Some of the students had an additional disability, either a learning or emotional one, but no other serious physical disability.

The Mixed Disability group (N = 24) included all students who had cerebral palsy, emotional disturbances, learning disabilities, or were classified as mildly retarded with an additional disability.

The Severely Retarded group (N = 8) included only one set of students, all of whom were severely retarded, sufficiently so that they were unable to take standardized reading tests. This was the group whom we expected would have the most difficulty in learning and using the telecommunications system and whom we expected would be least likely to be helped by participation in the program.

The breakdown of primary disability by category is given in Table 1. IQ distribution by disability category in Table 2.

This division of students is a finer cut than used in the original end of first year report. It has been developed to improve the

specificity of the analysis of the data from two year's experience with the Project and reflects, as well, the following perspectives:

- that this is the best set of subject divisions available with a small sample size
- that early onset deafness is a more crucial and overriding disability than the particular types of emotional problems some of the deaf students may have
- that it is difficult to determine the specific meaning or implications of a diagnosis of emotional or learning disability since no uniform definition is in use
- that the intellectual capacities of the group of students with cerebral palsy was in fact quite mixed despite their general categorization as retarded

**Table 1**
Primary Disability by Disability Group
Disability Group

| Primary Disability | Deaf | | Mixed | | Severely Retarded | | Totals | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| Cerebral Palsy | 0 | 0 | 9 | 37.50 | 0 | 0 | 9 | 9.89 |
| Deaf | 59 | 100 | 0 | 0.00 | 0 | 0 | 59 | 64.84 |
| Learning Emotionally Disabled | 0 | 0 | 10 | 41.67 | 0 | 0 | 10 | 10.99 |
| Retarded | 0 | 0 | 4 | 16.67 | 8 | 100.0 | 12 | 13.99 |
| Unknown | 0 | 0 | 1 | 4.17 | 0 | 0 | 1 | 1.10 |
| Totals | 59 | 100 | 24 | 100.00 | 8 | 100.0 | 91 | 100.00 |

**Table 2**
IQ Level By Disability Group
Disability Group

| IQ Category | Deaf | Mixed | Severely Retarded | Totals | |
|---|---|---|---|---|---|
| | N | N | N | N | % |
| Superior | 10 | 0 | 0 | 10 | 10.9 |
| Above Average | 9 | 1 | 0 | 10 | 10.9 |
| Average | 34 | 1 | 0 | 35 | 38.5 |
| Low Average | 6 | 3 | 0 | 9 | 9.9 |
| Retarded | 0 | 19 | 0 | 19 | 20.9 |
| Severely Retarded | 0 | 0 | 8 | 8 | 8.8 |
| Totals | 59 | 24 | 8 | 91 | 99.9* |

*error due to rounding

## Demographic Characteristics Of Subjects: Sex

Study participants were heavily weighted towards males overall, as shown in Table 3. However, on a disability group basis, this was true only in the Mixed Disability and Severly Retarded groups.

**Table 3**
Sex Of Subjects By Disability Group
Disability Group

| Sex | Deaf | | Mixed | | Severely Retarded | | Totals | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| Female | 26 | 44.0 | 7 | 29.0 | 1 | 12.5 | 34 | 37.4 |
| Male | 33 | 56.0 | 17 | 71.0 | 7 | 87.5 | 57 | 62.6 |
| Totals | 59 | 100.0 | 24 | 100.0 | 8 | 100.0 | 91 | 100.0 |

## Race Or Ethnic Identity:

The participants were divided overall into roughly half White and half Black or Hispanic, although the Black and Hispanic youths seemed over-represented in the Mixed Disability and Severely Retarded groups. This data is shown in Table 4.

**Table 4**
Race or Ethnic Identity By Disability Group
Disability Group

| Race | Deaf | Mixed | Severely Retarded | Totals | |
|---|---|---|---|---|---|
| | N | N | N | N | % |
| Unknown | 0 | 1 | 0 | 1 | 1.1 |
| Asian | 3 | 2 | 0 | 5 | 5.4 |
| Black | 9 | 10 | 3 | 22 | 24.2 |
| Hispanic | 14 | 8 | 2 | 24 | 26.4 |
| White | 33 | 3 | 3 | 39 | 42.9 |
| Totals | 59 | 24 | 8 | 91 | 100.0 |

## Age

The age range of the overall study participants was wide, from 11.7 years to 20.5 years, as determined as of January 1, 1986. The range by disability category was narrower in the case of the Deaf and Severely Retarded groups, and widest in the Mixed Disability group. It should be noted, however, that in actual numbers only four of the students were less than 13 years of age (two in the Deaf group and two in the Mixed Disability group) and only three were 19 or over, and all of these were in the Severley Retarded group. What is perhaps most important to note is that the two major user groups, the Deaf and the Mixed Disability, had median ages that were close to each other and to the overall median. Information on age of subjects is shown in Table 5.

**Table 5**
Age Of Students, As Of January 1, 1986, By Disability Group

| Disability group | # | Age Maximum | Age Minimum | Age Average | Age Median |
|---|---|---|---|---|---|
| Deaf | 59 | 18.3 | 12.9 | 16.0 | 16.2 |
| Mixed | 24 | 18.3 | 11.7 | 16.1 | 16.0 |
| Severely Retarded | 8 | 20.5 | 16.2 | 17.9 | 17.1 |
| Totals | 91 | 20.5 | 11.7 | 16.2 | 16.3 |

## Analysis of Results-Year 1

The analysis of the results of the study in terms of the various tests identified above will be presented by measure. Analysis is by disability and by frequency of use grouping detailed in Table 6.

**Table 6**
Range of Frequency Of Use By Disability Group-First Year

| | Deaf | Mixed | Severely Retarded | All Users |
|---|---|---|---|---|
| N = | 59 | 24 | 8 | 91 |
| Maximum | 53 | 45 | 7 | 53 |
| Minimum | 1 | 1 | 1 | 1 |
| Mean | 13.2 | 9.5 | 2.9 | 11.3 |
| Median | 9 | 7 | 2 | 7 |

### Frequency of Use Characteristics and Groupings of Students

The second major categorization or grouping of study participants relates to frequency of use of the telecommunications system.

While number of times logged on to the system is, at best, a gross measure, and does not take into account the length of each session, the number of words, sentences, or coherent thought

groups, it is a consistent and measurable one. Corrections, interruptions, and off-line work all make other measures hard to use for this purpose in a consistent fashion.

For the study, individuals have been assigned to one of two groups: high frequency users and low frequency users. The criteria for high frequency use for the Deaf group was 20 or more uses in the first year of the study, and for the Mixed Disability and Severely Retarded groups was 10 or more uses in the first year of the study. A use was defined as a separate logged on session. Students in the Mixed Disability and Severely Retarded group had more difficulty with the procedures and technology of the Project and required considerably more time and teacher assistance than the deaf students. Hence, it was necessary to make the cut-off point lower when defining high frequency use for these groups. Frequency of use by disability group is given in Table 7.

**Table 7**
Frequency of Use by Disability Group - First Year

| User Group | Deaf | Mixed Disability | Totals |
|---|---|---|---|
| High Frequency Users | 11 | 10 | 21 |
| Low Frequency Users | 48 | 14 | 62 |
| Totals | 59 | 24 | 83 |

No analysis was done on the data from the Severely Retarded group. Difficulty in use of the equipment and procedures required constant supervision by the teacher and reduced the system in its current form for use by the severely retarded. Only one student in each year of the Project reached a total of seven uses; none reached ten uses; and median use was only two in the first year. The students were considered untestable in terms of Standardized Reading tests. Narrative reports from teachers are included in another section.

### Standardized Reading Tests-First Year

The results of the standardized reading tests indicate that definite change in normal curve equivalents scores is found among certain of the study groups for high frequency users. The data on frequency of use and reading scores as expressed by nor-

mal curve equivalents were analysed with a T-test, a difference of means test for dependent samples with a low number of dependent pairs. The results of the analyses are given in Tables 8 and 9.

One sub-group of students emerges as having statistically significantly higher reading scores after one year of telecommunications system use. This is the high frequency user Deaf students.

The importance of the findings regarding high frequency users cannot be underestimated. The fact that not all groups showed the same change or lack of it bears on the difficult issue of how much any of the groups might have been expected to change without the Project. More specifically, if the change was due simply to normal changes as a student ages and progresses in school, there should be no difference in statistical significance between the high frequency and low frequency user groups.

**Table 8**

Standardized Reading Test Results for Deaf Students – First Year*
Pre- vs. Post-Test Using Normal Curve Equivalents

| | High Frequency Users | Low Frequency Users |
|---|---|---|
| $\bar{X}_D$ | 8.1 | 1.9 |
| $S_D$ | 12.3 | 14.2 |
| N = | 11.0 | 37.0 |
| | Significant | Not Significant |

T-Test for Dependent Samples – Difference of means
$\alpha$ = .05 for all tests – one tailed test
*N.B.: Pre- and post-test results were not available for all subjects participating in the study for the first year post test.

**Table 9**
Standardized Reading Test Results for Mixed Disability and Cerebral Palsy Students – First Year*
Pre- vs. Post-Test Using Normal Curve Equivalents

| | Cerebral Palsy High Frequency Users** | Mixed Disability Low Frequency Users (Exc. CP**) |
|---|---|---|
| $\bar{X}_D$ | 5.2 | 4.7 |
| $S_D$ | 10.6 | 17.1 |
| N = | 8 | 8 |
| | Not Significant | Not Significant |

T- Test for Dependent Samples – Difference of Means
$\alpha$ = .05 for all tests – one tailed test
*N.B.: Pre- and post-test results were not available for all subjects participating in the study for the first year post test.
**Since there was only one high frequency non-cerebral palsy user and only one cerebral palsy low frequency user, testing was done separately for cerebral palsy high frequency users and non-cerebral palsy low frequency users.

## Literacy Attitude - First Year

Attitudes toward reading and writing, the two components of literacy, were strongly correlated in the responses to the questionnaire used in this study. Pre-test responses indicated that r = .642, certainly high enough for a reliable use. Additionally, the reading and writing relationship continued throughout the study, since the two year post-test value for r = .561.

The reading and writing sections were also consistent during the study, particularly in the writing area. These relationships are shown in Table 10.

While the questionnaire shows considerable consistency and relationship between the components of literacy, this does not in itself indicate a relationship, if any, between the attitudes expressed in the questionnaire and actual reading and writing abilities. In fact, we find on analysis of the data for change in attitude, that in only one group can a significant change be found in attitude toward reading and writing using a T-test as in the case of the standardized reading tests.

The sole case of significant difference is in the Cerebral Palsy group, whose attitude toward reading in the first year post-test data showed a statistically positive increase as demonstrated in Table 11.

However, these findings should be tempered by the small size of the group and by the fact that scoring required changing a nominal variable to a cardinal one.

Weak values of r were found for the relationship between changes in attitudes toward reading and writing and changes in the normal curve equivalent of the standardized reading test scores, our strongest and most consistently measurable variable.

**Table 10**
Relationship Between Reading and Writing Components of the Literacy Attitude Questionnaire
Value of r – all users

| | Pre-Test Reading Component | Pre-Test Writing Component |
|---|---|---|
| Pre-Test Reading Component | | .642 |
| Pre-Test Writing Component | .642 | |

r = .642

**Table 11**
Literacy Attitude
Positive Change in Attitude Toward Reading of Cerebral Palsy Students

| | Cerebral Palsy |
|---|---|
| $\bar{X}_D$ | .88 |
| $S_D$ | .86 |
| N = | 8 |
| | Significant |

T-Test for Dependent Samples – Difference of Means
$\alpha$ = .05 for all tests – one tailed test

## Student Evaluation Questionnaire-First Year

The student evaluation has an important function in its direct relation to attitude toward reading and writing. Since Project findings indicate that the use of the telecommunications system has had a positive effect on reading and writing, as has been established by changes in the standardized reading test scores and the measures of writing, then we would like to identify those aspects of the intervention strategy that are most likely to attract students. For this purpose, the Student Evaluation Questionnaire is good, since it separates clearly the reading and writing functions, and the sending for others to read as opposed to receiving what others have written functions.

Given this approach, we will view the results of the questionnaire primarily in regard to what it can tell us about which aspects of the telecommunications system the students like most and found most important. Results are given in Table 12.

**Table 12**
Student Evaluation Questionnaire – First Year
Proportion Who Very Much Liked Activity or Found It Very Important

| | Deaf Students | | Mixed Disability | | |
|---|---|---|---|---|---|
| | High Frequency Users % | Low Frequency Users % | All%** | High* Frequency Users % | Low* Frequency Users % |
| Writing private Letters | 90.9 | 34.0 | 44.8 (58) | 62.5 (8) | 54.5 (11) |
| Reading private Letters | 72.7 | 48.4 | 53.4 (58) | 100.0 (8) | 72.7 (11) |
| Sending to the Bulletin Board | 63.6 | 44.4 | 48.9 (48) | 12.5 (8) | 63.6 (11) |
| Reading from the Bulletin Board | 54.5 | 48.6 | 50.0 (47) | 25.0 (8) | 63.6 (11) |
| Greater importance of second draft for Bulletin Board | 45.5 | 35.3 | 37.8 (46) | N.A. | 20.0 (10) |

* High frequency mixed disability users were in fact all students with cerebral palsy since there were an insufficient number of mixed disability students not including the cerebral palsy group to analyse separately. Low frequency mixed disability users included only one user with cerebral palsy.
** All not available for Mixed Disability because of separate high and low groups.

While the sample sizes, particularly in the case of the Mixed Disability/Cerebral Palsy group, are small and thus a change of just a few additional subjects could have a considerable effect, certain patterns seem clear from this data:

- all groups by disability and by level of use were more interested or favorably inclined toward private communication than towards public Bulletin Boards,
- both low level user groups, the Deaf and the Mixed Disability groups, were either more favorable toward or effectively neutral between sending/writing and reading. In these groups, there was a definite preference for reading rather than writing private letters,

- the high level users groups were quite distinct from each other. The Cerebral Palsy group followed the pattern of the low level users in preferring to read rather than write private letters and being equally positive in their feelings toward sending or reading Bulletin Board material. The Cerebral Palsy group, however, was more strongly positive towards private letter activities than were either low level user group.
- The pattern of the high level deaf users was quite distinctive. When high level use was defined substantively, the more stringent determination, they were very positive overall to the use of the system but showed strong preference for writing/sending activities, in contrast to all other groups. When defined by the median use value for the group, they more closely resembled the other high user group.

## Analysis of Results-Years 1 and 2 Combined

The two year analysis was based on cumulative data for the first two years of the Project. The criterion for high and low frequency groups was determined by the median value of cumulative use. It should be noted that this value is less than that used for the substantive criteria for the Deaf group in the first Project year analysis. Hence it was less meaningful. There were insufficient subjects to allow for the variety of categories an intelligent two year substantive criteria would have required.

The use of the median values, however, did give us a good comparative basis for the two years' work and is a standardly acceptable way of dividing the groups. However, analysis using a substantive criteria for high and low frequency grouping would have been likely to show better the change between students who used the telecommunications appreciably more than other students. The median frequency of use for the Deaf group for year two was 15 and for the Mixed Disability group was 9.

Of the 91 students who were identified in the first year of the study as participants, 61 remained in the Project in the second year. This apparently high attrition rate was primarily the result of graduation of many of the students, especially in the Deaf group. The attrition, however, caused no significant changes in the distribution of disabilities or demographic characteristics in either of the groups. Because severely retarded students were not

testable, they were not included in the analysis. Narrative reports of their participation is included in the section on "Experiences with Special Disabilities."

## Frequency of Use Characteristics and Groupings of Two Year Participants

Table 13 details the frequency of use by disability characteristics of two year participants and Table 14 the division of the disability groups into high and low level users, based on cumulative use for the two year period.

**Table 13**
Range of Frequency of Use by Disability Category
Two Year Cumulative Use

| | Deaf | Mixed Disability | All Users |
|---|---|---|---|
| Maximum | 66 | 108 | 108 |
| Minimum | 4 | 2 | 2 |
| Mean | 22.6 | 22.9 | 23 |
| Median | 15.0 | 9 | 15 |
| N = | 37 | 15 | 52 |

**Table 14**
Frequency of Use by Disability Group - Second Year

| | Deaf | Mixed Disability | Total |
|---|---|---|---|
| High Frequency Users | 22 | 9 | 31 |
| Low Frequency Users | 15 | 6 | 21 |
| Total | 37 | 15 | 52 |

## Standardized Reading Tests - Second Year

Analysis of the data from the two year cumulative use and cumulative change in the normal curve equivalent of the stand-

ardized reading test scores confirm our first year findings in the case of the deaf students.

We find the same results over the two-year period for the Deaf student group that we did for the first year, that is, there is a statistically significant improvement in reading scores for high level users that is not found for the low level users. These results are shown in Table 15.

The results of the tests for the Mixed Disability/Cerebral Palsy student groups continue to show no significant difference in normal curve equivalent. However, this data is by no means conclusive, as the very small sample sizes for each of the groups means that one value can very heavily weight the results. As an example, the Cerebral Palsy group of high level users includes points on the normal curve equivalent. However, if the one negative value is removed from the group, the mean change for the remaining four group members is 8.15. A change of such magnitude caused by one member of a group indicates that a considerably larger sample size would be desirable before final conclusions are drawn. Results are given in Table 16.

**Table 15**
Standardized Reading Test Results for Deaf Students – Second Year Pre- vs. Post-Test Using Normal Curve Equivalents

| | High Frequency Users | Low Frequency Users |
|---|---|---|
| $\bar{X}_D$ | 10.2 | 4.0 |
| $S_D$ | 9.6 | 14.7 |
| N = | 19.0 | 15.0 |
| | Significant | Not Significant |

T-Test for Dependent Samples – Difference of Means
$\alpha$ = .05 for all tests

**Table 16**
Standardized Reading Test Results Mixed Disability Students - Second Year
*Pre- vs. Post-Test Using Normal Curve Equivalents

| | Mixed Disability (including Cerebral Palsy) | | Cerebral Palsy Only | |
|---|---|---|---|---|
| | High Frequency Users* | Low Frequency Users | High Frequency Users | Low** Frequency Users |
| $\bar{X}_D$ | 1.7 | 5 | 3.9 | |
| $S_D$ | 10.7 | 7.1 | 10.3 | |
| N = | 9 | 3 | 5 | |
| | Not Significant | Not Significant | Not Significant | |

T-Test for Dependent Samples – Difference of Means
$\alpha$ = .05 for all tests – one tailed tests
* Data on reading scores not available for all users
** One student only in this category

## Literacy Attitude - Second Year

Consistent with the results of the first year analysis, no statistically significant changes were found in either the reading or writing components of the groups.

## Student Evaluation Questionnaire - Second Year

Data from the Student Evaluation Questionnaire for the second year of the study is detailed in Table 17.

Sample sizes for the Mixed Disability/Cerebral Palsy groups were very small, sufficiently so that we did not feel confident in drawing conclusions from the data for the group and include it as illustrative only.

The Deaf group follows the pattern found in the first year of a more positive response to reading/receiving than to writing/sending or at least an evenly divided one.

**Table 17**
Student Evaluation Questionnaire
Proportion Who Very Much Liked Activity or Found It Very Important

| | Deaf Students | | | Mixed Disability | | |
|---|---|---|---|---|---|---|
| | High Frequency Users % | Low Frequency Users % | All%** | High* Frequency Users % | Low* Frequency Users % | All%** |
| Writing private Letters | 18.2 | 46.6 | 29.7 (37) | 100.0 (5) | 100.0 (5) | |
| Reading private Letters | 40.9 | 66.7 | 40.0 (37) | 60.0 (5) | 60.0 (5) | |
| Sending to the Bulletin Board | 31.8 | 40.0 | 35.1 (37) | 25.0 (5) | 80.0 (5) | |
| Reading from the Bulletin Board | 31.8 | 50.0 | 38.9 (36) | N.A. | 60.0 (5) | |
| Greater importance of second draft for Bulletin Board | 45.5 | 53.3 | 45.9 (37) | N.A. | N.A. | |

* Mixed Disability High-Frequency users were in fact all students with cerebral palsy since there were an insufficient number of mixed disability students not including the cerebral palsy group to analyze separately. Mixed Disability Low-Frequency users included only one user with cerebral palsy.
** This analysis could not be made due to the separate character of the high and low frequency user groups.

## Teacher Evaluation of the Effects of the Project

The Teacher Evaluation Questionnaire asked all questions in the form of whether improvement noted would have been expected had the student not been in the Project. All questions allowed for a response of Yes, No or Unsure.

The questionnaire was deliberately set up in this form to insure that a positive response from the teacher would mean both that the student had improved and that the improvement had been either not expected at all or to the perceived extent given, the teacher's knowledge and experience with both the particular student and similar students.

Responses by the teachers were more positive for the high frequency users than low frequency users in the Deaf group. Results

for the Mixed Disability group were too few for us to be able to draw conclusions, but the results are included for descriptive purposes. These results are presented in Tables 18 and 19.

In the case of the deaf students, response was definitely positive in the case of the high frequency users, most notably in the areas of writing skill, attitude toward writing, and self-confidence. This pattern was also in the case of the low frequency users, but was evident at a lower level of positiveness.

What is of great interest in the results of this questionnaire was the very high positive evaluation of the effect of the participation in the Project on attitude towards writing. For the deaf students, the most common and ordinary form of communication between people, the spoken word, had been cut off or severely circumscribed for many at an early age. The presentation of writing as a function of communication rather than of academic requirements may have provided a significant boost in the attitude towards it, and thus in the motivation of students to make use of the written word more extensively than they would otherwise have been inclined to do.

It is clear that the more one writes and the more one reads,the better one becomes at it. This, too, is reflected in the teacher's appraisal, in that, for both the high and low frequency users, improvement in writing skill was the next most highly rated benefit of program participation.

**Table 18**
Teacher Evaluation of the Effect of Participation in the Project
Positive Effect – Deaf Students

| | High Frequency Users % | Low Frequency Users % |
|---|---|---|
| Reading skill | 35.0 | 14.3 |
| Attitude to reading | 30.0 | 14.3 |
| Writing skill | 59.1 | 37.5 |
| Attitude to writing | 68.2 | 43.7 |
| Self-confidence | 59.1 | 25.0 |
| Interaction with others | 45.5 | 14.3 |
| Other academic areas | 40.0 | 14.3 |
| N = | 22 | 16 |

**Table 19**
Teacher Evaluation of the Effect of Participation in the Project
Positive Effect – Mixed Disability Students

| | All High Frequency Users % | UCP High Frequency Users % | Low Frequency Users % |
|---|---|---|---|
| Reading skill | 55.6 | 40.0 | 80.0 |
| Attitude to reading | 66.7 | 60.0 | 100.0 |
| Writing skill | 33.3 | 0.0 | 40.0 |
| Attitude to writing | 77.8 | 80.0 | 80.0 |
| Self-confidence | 77.8 | 80.0 | 80.0 |
| Interaction with others | 88.9 | 100.0 | 100.0 |
| Other academic areas | 33.3 | 0.0 | 80.0 |
| N = | 9 | 5 | 5 |

# Analysis of Results - Year 3

The Telecommunications Project was developed on the basis of two major theoretical premises: that reading and writing are interdependent components of literacy and that interpersonal communication with a wider world can be a powerful motivating force. These two premises were combined in a three year study of the effect of telecommunications use, including both electronic personal mail and public Bulletin Boards, on the literacy achievement of disabled young adults.

Analysis of data after two and three years of the project have given strong support to both premises. This report will serve to present the results of the third year of the study and a reanalysis of the second year data on the basis of experience with the third year. It will also briefly present the three major conclusions that we feel can be drawn from the work.

## Summary of Results

Data and observation from the third year of the project led to a recategorization of the disability groups and a redefinition of High and Low Frequency users.

Participants were classified into groups reflecting the physical, emotional or intellectual nature of their underlying disability. With this reclassification, we had excellent data for a three year analysis and a two year reanalysis of the group of students who were deaf or had cerebral palsy. Data was insufficient for an analysis of results for the emotionally and/or learning disabled group, and the system in its current form had already been evaluated as inappropriate in its current form for the severely retarded.

The deaf/cerebral palsy students were classified into Non/Low Frequency user and High Frequency user groups on the basis of frequency of use over both two and three years. Using the new classification of user level, statistically significant differences were found between the Non/Low Frequency user and High Frequency user groups. High Frequency users had significant improvements in standardized reading test scores when the pre-study scores were compared to scores from after both two and three years of study participation. There was, in contrast, no such change in the scores of the Non/Low Frequency users.

Similarly, an analysis of the two year participation data for holistic scoring of written drafts showed a statistically significant

level of improvement among the High Frequency users but not among Non/Low Frequency users.

Data from other measures and instruments were less clear, but indications and anecdotal information from the Teacher and Student Evaluations pointed to a positive impact from use of the telecommunications system and a desire on the part of the participants to continue to use such a system. The indications were that the desire for continued use of the system was based on a strong need to overcome the barriers to communication with a widening circle that the disabilities had created. This desire can be seen as a significant force in motivating the work for literacy improvement.

## Conclusions

The first conclusion to be drawn from the study is support for the concept of the interdependence of reading and writing and is based on the parallel pattern of the improvement seen in both reading and writing in the High Frequency user groups.

The second finding serves to support the need to communicate as motivation. While we have no direct statistical test for this, it is clear from the student evaluations, in particular, that the desire to be in contact, to reach and be reached by the wider world, was crucial to the level of frequency of system use. Since system use is in turn a factor in improved literacy achievement, the motivation for using the system is of great importance.

Finally, the study leads us to a revised or expanded view of the role of computers in education. Computers have found a role in education as both 'thinking tools', primarily through the use of LOGO and similar computer language curricula, and through computer aided instruction. In both these cases, their function is person to machine.

This study points to a significantly expanded role, as a means of person to person communication as an educational tool, both specifically in the improvement of literacy achievement and more generally as an aid in overcoming the educational barriers imposed by serious disabilities.

## Introduction to Third Year Analysis

Data from the third and final year of the Project offered us the opportunity to extend our examination of the impact of the use of the telecommunications system on the program participants and to examine the information from all three years of

the Project in the light of what was learned in the third year. While the third year group was small and, therefore, our statistical analysis will be restricted, the composition of the group suggested a very useful rethinking of our assumptions for data analysis.

## Three Year Participants

The third year student group was by far the smallest, including only fourteen participants, as many previous participants had graduated or moved or were attending a school that was only a two year study participant. Only two disability groups were presented in the third year, the deaf and those with cerebral palsy. Disability data for the three year participants is presented below.

**Table 20**
Sex and Disability of Three Year Participants

| Disability Group | Male | Female | All |
|---|---|---|---|
| Deaf | 4 | 5 | 9 |
| Cerebral Palsy | 1 | 4 | 5 |
| All | 5 | 9 | 14 |

The average age of the group was about 17, and it was not significantly different in either disability group.

**Table 21**
Age and Disability of Three Year Participants

| Disability Group | Mean Age | Highest Age | Lowest Age |
|---|---|---|---|
| Deaf | 17.9 yrs. | 20 | 15 |
| Cerebral Palsy | 16.6 yrs. | 19 | 14 |
| All | 17.4 yrs. | 20 | 14 |

## Rethinking the Assumptions

The most important changes that the third year data suggested were a recategorization of disability and a focusing of greater emphasis on the level or frequency of system use.

## Recategorizing the Disability Groups

We began the recategorization by thinking of the disabilities of the students who had participated in the study at any time as three categories, rather than by specific disability.

The first category was disabilities that related to problems that were motor, sensory or neurological, but that implied no necessary intellectual impairment, although they presented major barriers to education, literacy and general communications. This group included deaf students and those with cerebral palsy.

The second group included all mixed diagnosis, a category including participants in which an emotional or learning disorder has been defined as the most significant disability. Our findings on the basis of the second year of the study had been inconclusive, since the number in the group was small and the level of use insufficient to distinguish clearly any effects. Anecdotal information on this group, however, did seem to indicate that the system approach might have potential for increasing accessibility to treatment, which in itself might be expected to improve educational achievement.

The final group in the original study was severely retarded, and the telecommunications system had proven to be not of use to them in its present form, for the keyboard/sign on system alone was more than most of these students could learn to use with any facility or ease.

Thus for the third year analysis and any reanalysis of the results from two years we now considered only the Deaf/Cerebral Palsy group.

## Recategorizing the Frequency of Use Groups

A careful look at the cumulative frequency of use data from the third year showed more clearly than had that of previous years a possible clumping of user groups into Low Frequency users (with fewer than ten uses in a two or three year period), Moderate Frequency users (from 10 to 35 uses over the two or three years) are High Frequency users (with more than 35 uses over the comparable period of the study). On this basis it was decided that participants with minimal use, the Low Frequency user group, could be considered as virtually Non-Users, since such slight use of the system could not be expected to have any discernible effect on literacy achievement or attitudes. At the same time, we did not want to establish an actual 'non-user' group, since we could not then separate out those students who did not use the system fre-

quently because the keyboard or sign on procedures presented an insurmountable barrier.

This grouping, which provides High and Non/Low Frequency user groups at the extremes permits us to do a type of statistical analysis that was not done in the previous year. This will provide us with a clearer picture of the effects of system use by eliminating the continuous character of the data that the previous inclusion of Middle or Intermediate users created.

## Reanalysis of Data from Two Years and Analysis of Three Year Data

On the basis of the recategorization of both disability groups and frequency of use, we decided to reanalyze the data from two years of the study, since it has a larger participant group, and to analyze that from the three year participant group. The following sections detail the results of both analyses. Each of these measures was discussed in detail in the year two report, and with the exception of the rearrangement of data by disability and frequency of use, each has been used in precisely the way previously detailed.

Significant results were found in what we had considered the two strongest measures, the Standardized Reading Tests and the Holistic Scoring of written materials (T score). Other measures provided less clear results, but some interesting indicators and directions for consideration as well as some consistent anecdotal information.

## Standardized Reading Tests Two Year Participants

Data on the change in the Normal Curve Equivalents of the Standardized Reading Test scores for two year participants for whom both pre-test and second year scores were available are presented on the following page.

**Table 22**
Standardized Reading Test Normal Curve Equivalent Scores After Two Years of Project Participation

| | All deaf & Cerebral Palsy Participants | Non/Low Frequency Users Over 2 years | High Frequency Users Over 2 years |
|---|---|---|---|
| N = | 40 | 11 | 8 |
| Mean Normal Curve Equivalent Score Pre vs Yr 3 | 6.9 | 6.7 | 12.8 |
| Mean Use 2 yr cum. | 24 | 7 | 61 |
| Range of Use 2 yr cum. | 3-108 | 3-10 | 37-108 |

T – Test for Dependent Samples - Difference of means
$\alpha$ = .10 for all tests

On the basis of the established distinction between High Frequency users and those who were essentially non-users, we see clearly that Non/Low use levels are associated with smaller positive changes in the Normal Curve Equivalent. The difference is clearly pictured in Graph 1.

This result provides important support for the theoretical expectation of the positive effect such a telecommunications system could have in overcoming barriers to literacy created by disabilities such as deafness and cerebral palsy. It also supports the hypothesis that such a system, with the possibility of rapid if not immediate interaction with a wider world of others it provides might be a motivational support for improved literacy. This second topic will be discussed further in the section on the student evaluations of the project.

The relationship between level of use and improvement in reading score also is strongly supported by the change in mean in the Normal Curve Equivalent at different levels of use, as presented in the following chart in Graph 2.

**Table 23**
Frequency of Use and Change in the Mean Difference of the Normal Curve Equivalency After Two Years of Project Study Participation

| Level of Use (2 yr cum.) | Mean Normal Curve Equivalency | N |
|---|---|---|
| ≤ 10 | 6.7 | 11 |
| > 10 | 6.0 | 29 |
| > 20 | 8.3 | 22 |
| > 25 | 8.7 | 8 |
| > 30 | 8.9 | 11 |
| > 35 | 12.8 | 8 |
| > 50 | 13.5 | 6 |

These results are directly in line with the results obtained in the analysis done at the end of the second year of the study for deaf students. They are particularly striking in that, as discussed in the earlier report, frequency of use was not strongly associated with initial reading score. That is, students with higher scores at the start of the project were not more likely to be High Frequency users. The effect on reading scores shown here, therefore, is not a 'good students do better phenomena'.

Further analysis of the Normal Curve Equivalents of the High and Non/Low Frequency user groups over the two year period, serve to support this premise. The test of the mean change in reading score of the two groups separately, as dependent samples, we find that the change for the High Frequency user group from pre-test to post year two is significant while that for the Low Frequency user group is not. (T-test for dependent sample, $\alpha = .10$)

The fact that the Low Frequency user group has not improved their reading ability over a two year period is clear evidence of the difficulties they face in literary achievement. It is not evidence as well that in the absence of new intervention strategies such as this, the discouraging pattern is likely to continue.

## Three Year Analysis

The small size of the three year user group has made analysis difficult. In fact, in order to get more than one person in the category, the Non/Low Frequency users, the category itself had to be redefined to include participants with 12 or less uses. High Frequency users are defined as having greater than 40 uses. But even with the size problem, and that of the small size of the three

year group, the High and Non/Low Frequency groups showed significant difference in the change in the mean of the Normal Curve Equivalent of reading test scores when the three year results are compared with the pre-test. The data is presented below and also in Graph 1.

**Table 24**
Standardized Reading Test Normal Curve Equivalent Scores After Three Years of Project Participation

| | All deaf & Cerebral Palsy Participants | Non/Low Frequency Users Over 3 years | High Frequency Users Over 3 years |
|---|---|---|---|
| N = | 14 | 3 | 6 |
| Mean Normal Curve Equivalent Score Pre vs Yr 3 | 7.6 | 6.13 | 10.0 |
| Mean Use 3 yr. cum. | 34 | 10 | 49 |
| Range of Use 3 yr. cum | 8.18 | 8-12 | 39-118 |

T – test for Dependent Samples
$\alpha = .10$

In addition, there was a significant difference between the mean Normal Curve Equivalent of the actual pre - and post-study scores for the High Frequency users although no such difference was found for the Non/Low Frequency users. (T-test of Dependent samples, $\alpha = .10$)

Note that the minimum value for the High Frequency group has been raised. This is to acknowledge in real use terms the passing of another year.

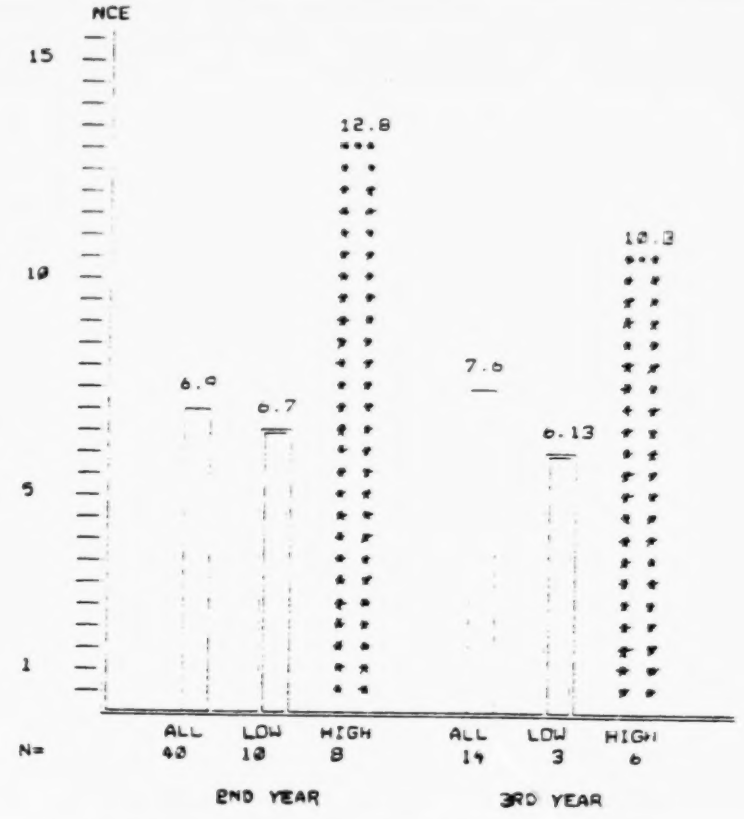
Other data from the third year of the Project is supportive of the findings from the larger, two year group in showing the relationship between the mean change in the Normal Curve Equivalent and the level of use. The findings are presented in Table 25 and in Graph 2. While the small numbers in this third year analysis mean that the results must be treated with caution, the consistency of the results with those of the second year are good indicators of a real and continuing effect of participation in the Project.

**Table 25**
Frequency Of Use and Change In The Mean Difference Of The Normal Curve Equivalent After Three Years of Project Participation

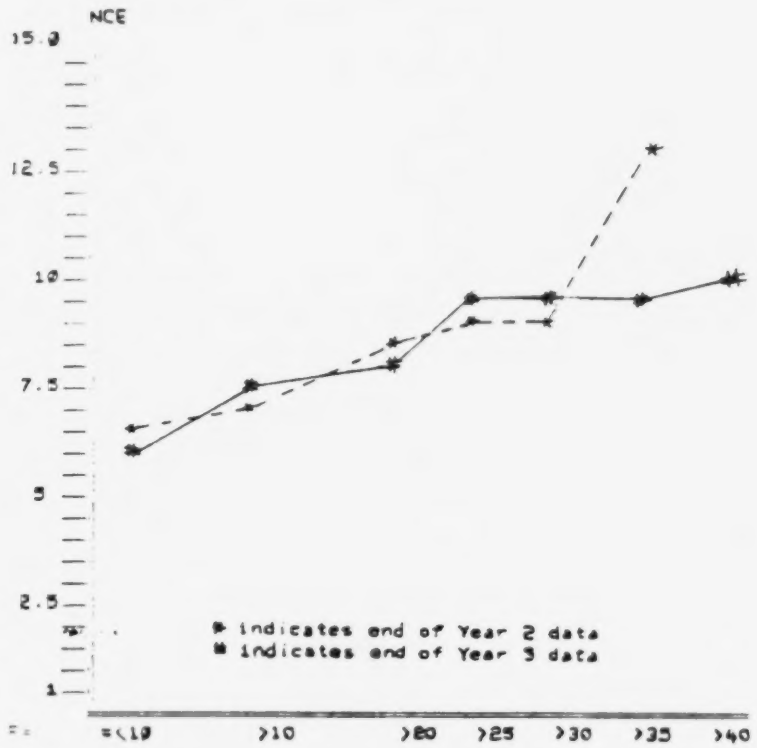
| Level of Use (3 yr cum.) | Mean Normal Curve Equivalent Change | N |
|---|---|---|
| 12 | 6.1 | 3 |
| 10 | 7.2 | 13 |
| 20 | 8.0 | 8 |
| 25 | 9.1 | 7 |
| 30 | 9.4 | 6 |
| 35 | 9.4 | 6 |
| 40 | 10.0 | 5 |

Thus the data from both two year and three year participants suggest strongly that substantial use of the telecommunications system, including both private or individual electronic mail and public electronic Bulletin Boards, is supportive of improved literacy. This data is insufficient to determine minimum and maximum effective uses, but it is clear indicator of the probable basic level and of the pattern of the relationship between system use and literacy improvement.

**Graph 1**
Average Change In The Normal Curve Equivalent Of Standardized Reading Test Scores After Two and Three Years of Product Participation



**Graph 2**
Average Change In The Normal Curve Equivalent Of Standardized Reading Tests With Change In Frequency Of System Use After Two And Three Years Of Project Participation




A first analysis of the T-score, a Holistic evaluation of the change in writing ability from a first to a second draft, using the High and Non/Low Frequency user grouping for the second year data, has produced striking results, just as had the reanalysis of change in reading scores.

**Table 26**
Change In T-Score Of Written Work After Two Years Of Project Participation

| | High Frequency Users | Low Frequency Users |
|---|---|---|
| N = | 8 | 25 |
| % Improved Pre-Post Project | 72.7 | 28.0 |
| % Unchanged Pre-Post Project | 27.3 | 84.0 |
| % Worse Pre-Post Project | 0.0 | 8.0 |
| | Significant | Significant |

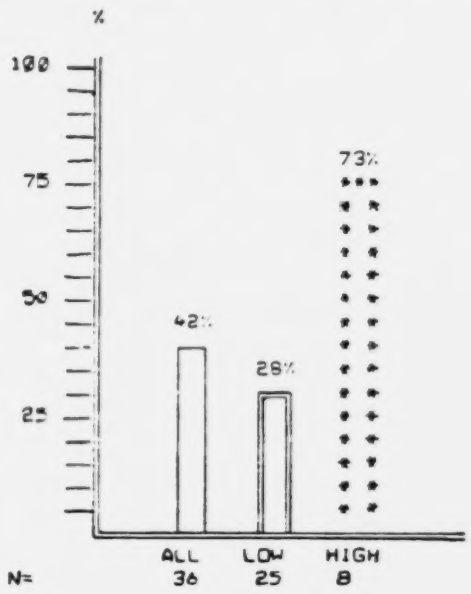
Chi Square
$\alpha = .10$

The difference between the two user groups is clear. The High Frequency users have improved their writing skill far more than the Low Frequency users. This is shown as well in Graph 3.

The data as presented is in line with the results of the analysis of the Normal Curve Equivalent of Standardized Reading Test scores. This is true both in that the High Frequency users show significantly greater improvement in their literacy improvement than do the Non/Low Frequency users and that the Non/Low Frequency users have not changed their reading or writing ability in any significant way at all over the two year period. That 84% of the Low Frequency user group showed no change in writing ability is again strong evidence of the difficulties to be overcome in education for disabled students and of the great need for new and innovative intervention techniques.

Three year-participant data on Holistic scoring of written work are considered in the section "Linguistic Analysis of Writing."

**Graph 3**
Change In T Value Of Written First And Second Drafts
Percent Of Participants With Positive Improvement After Two Years Of Project Participation




## Student Evaluations

Over 80% of students in both the High and Low Frequency user categories expressed positive attitudes towards reading material from others and writing to or for them, whether for Private Mailboxes or for the public Bulletin Boards.

All of the responses point to the great importance that contact with others has for the students. Two specific qualities make electronic mail especially appealing to students. One is relative immediacy. The quality of electronic mail is that a message sent can reach its destination with great rapidity - a reply can be returned just as quickly. Work done for the electronic Bulletin Board is available to be read by others as soon as it is entered. No conventional letter system or newspaper can match this on the scale of a telecommunications system.

The second quality is the access to unknown others out there. Adolescence is a time of great expansion in personality and personal horizons. A telecommunications system gives an individual

access to others outside the day to day environment on a regular and ongoing basis despite barriers dated to disability. The importance of 'out there' to these young people is underlined by the often repeated comments expressed in the "Student Evaluations". Lack of response is painful, the desire for contact very strong, and even with the unavoidably minimal contact that the participants of the Project got, many wanted it to continue and to become a regular part of their school environment.

## Linguistic Analysis of Writing

Positive changes in the ways students were able to put meaning into written text has been a major achievement of the Project. Based on the composition literature which suggests that frequency of writing for a purpose will improve students' writing abilities, the Project provided Electronic Mailboxes through which students could write at their own pace to peers, other students their age in different locations, or to their choice of adults involved in the Project. In addition, the Project enabled students to experience the writing of revised and edited pieces for the Electronic Schools Bulletin Board.

Because fluency and complexity of written language, the organization of discourse, and the elaboration and specificity found in the text are considered some of the qualitative differences among texts (Bruner, 1980; Loban, 1976; Beach, 1984), an analysis scheme was developed for the Project data which included these as criterion. In addition, we also saw the writing process as context-related and one in which there was a strong relation between students' purposes; the audience for their writing; and, their use of cognitive processes to accomplish it. These ideas became assumptions and were related to both the questions we asked about students' writing development and the methods we used to evaluate their progress. Information about these questions; the methods used to collect data; the analysis of students' writings; and, the results obtained are presented in this section of the report.

We asked two major questions: over time, from the start of the Project in 1985 to the end of the second year, did:

- students' writing change in fluency, organization and specificity?
- students' writing change in complexity and elaboration?

In addition to these two major questions, we looked for ways to describe linguistically the functions students' writing served for them and features which might illuminate writers' cognitive processes. Variations among letters written to peers and those written to adults were expected to provide us with further information about the writing of students to different audiences.

## Theoretic Basis of Analysis

There were many ways for us to look for quality of text; researchers, rhetoricians, literary critics, parents, teachers, boards of education, and educational examiners each consider their own needs and have differing criterion. We chose to look at the writings from both a psychological and a linguistic point of view. We used the linquistic notion of studying students' discourse in authentic situations; the Electronic Mailbox letters were similar to notes or letters written to others, and the Electronic Schools Bulletin Board was writing for a larger audience.

Because we knew that writings of various genre pose problems for comparison research (Cooper, 1984; Odell, 1977; Beach and Bridwell, 1984; and others), we attempted to keep types of writing as uniform as possible. Letter writing all had similar purposes for the students. The audience for the Electronic Schools Bulletin Board was more "public", but, the students used this medium to communicate primarily in a descriptive mode. The writings came from students freely using the electronic system. We avoided elicitation of writing beyond a request of students to write an introduction of themselves at the start of the Project and a final submission to the Electronic Schools Bulletin Board telling about a friend or event at home or school.

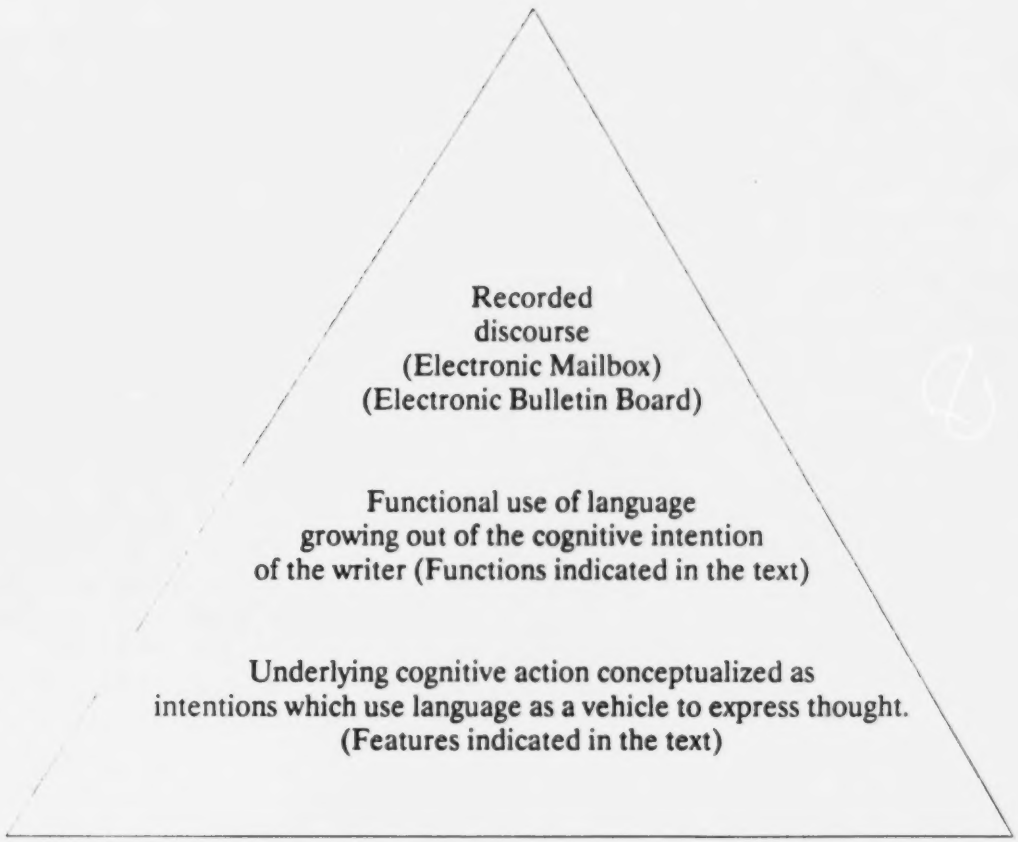
We also made a theoretical psychological assumption of the connections between thought and language in addition to planning for a real-life study of writing. We viewed these connections as resting on the writer's, or speaker's, intention to make meaning. These psychological understandings of intention bearing on thought and language led us to look at the functions expressed in the writings of students from a linguistic point of view.

The combination of a psychological-linguistic approach follows Shuy (1984) who saw the utterance, in this case the writing, as coming through two important layers: 1) a layer of thought, goals underlying psychological states; and, 2) language function, the way forms are organized to accomplish goals. He proposed an "iceberg" model by asserting:

> ...that underlying ideas or thoughts are first conceptualized as language functions (such as reporting facts or opinions, giving directives, complaining, thanking, promising, etc.). These conceptualized functions are then realized as observable behavior (written, spoken or signed, as in American Sign Language). Only the latter are observable and recordable (Shuy, 1984).

Because of this perspective, the analysis scheme was planned to examine certain features found in the language of the text. We looked for indications of the intended functions of the discourse and linguistic clues for underlying cognitive processes. This was hypothesized in a pyramid model following Shuy's "iceberg" as text growing upon a base of cognitive activity (Figure 1.):

**Figure 1**
**Pyramid Model**


Recorded
discourse
(Electronic Mailbox)
(Electronic Bulletin Board)
Functional use of language
growing out of the cognitive intention
of the writer (Functions indicated in the text)
Underlying cognitive action conceptualized as
intentions which use language as a vehicle to express thought.
(Features indicated in the text)

The pyramid model we proposed has as its base the writer's intention to make meaning in written form and his, or her, expectation of its reception by an audience. These intentions were inferred from the observation and the examination of writings produced by students. They were context-related, bound up in a maze of variables, among which were the writer's intellectual ability, knowledge, relationship to others, interpersonal

knowledge of the audience, desire to express meaning, and so on. In addition, the environment provided certain constraints: the time allowed from other instructional matters; adjustments needed to learn to use and share with others the computer keyboard and terminal; the ambiguous nature of the task in contrast to other school writings; and, above all, the value the classroom places on open-ended writing assignments.

One way we thought about the writers' intentions was through a pragmatic framework which viewed the meaning of the written discourse as a function of the conventions or conditions that constitute certain speech acts. For example, Searle, 1975, proposed that certain conditions must be met if a writer wishes to make a request: the writer must believe the audience is able to fulfill the request, must have some status or power, and must be sincere. M. Cooper, 1984, labels these speech acts in a categorical manner: a) perloctionary, those designed to affect the audience in some way; b) illocutionary intentions for the reader to understand that particular speech acts are being used (such as, informing, promising, dissenting, specifying); and c) locutionary, the goal to be understood as to be saying something, such as the expression of propositions linked together in an overall semantic structure. Though students usually do not have explicit knowledge of these speech act conventions, or in fact, follow them in totality, they are intertwined with the writer's cognitive, environmental, and interpersonal situation.

Therefore, in following a conceptualization that functional language grows out of the cognitive intentions of the writer and that text is best understood when we account for context, audience and purpose, we sought to look at not only the fluency, complexity, and elaboration of text, but to identify and describe the most frequent functions and linguistic features found in the writings.

## Measures

The primary techniques used to study the student writings were:

- Holistic Scoring of early and late writing samples (following Meyers, 1980)
- T-Unit analysis (following Loban, 1976)

We also looked at the variety of functions students used in their writings and several features which connected cognitive

processes to their written text as a means of descriptive analysis relating to cognitive processes and their expression.

The following two charts show the primary and secondary plans for analysis. Figure 2 illustrates the analysis plan for studying our two major questions and Figure 3 our descriptive examination of student text.

**Figure 2**

Analysis of Student Writings

| Data Type/Method of Obtaining | Purpose | Analysis Method Used |
|---|---|---|
| Pre/post writings Electronic Bulletin Board – first/last entry. | To determine change in writing over time – fluency organization & specificity. | Holistic Scoring |
| Student letters and Bulletin Board entries – a sample of unedited and unsolicited writing. | To determine change in writing over time – complexity and elaboration. | Mean number of T-Units |

**Figure 3**
Additional Descriptive Analysis of Student Writings

| Data Type/Method of Obtaining | Purpose | Analysis Method Used |
|---|---|---|
| Student letters – a sample of unedited and unsolicited writings. Student bulletin board – a sample of unsolicited and presumably edited writings. | To describe the number and variety of functions and features found in student texts. | Functions Features |
| Student letters to peers or adults | To describe "sense of audience" differences between letters to adults and letters to peers. | Mean number of T-Units |

The analysis measures of holistic scoring and average T-Units are described below.

**1. Holistic Scoring**

Following procedures suggested by Meyers (1980) the readers expected to become familiar with the style and writing abilities of the students and determine the scoring levels for the total holistic sample through the construction of an anchoring sample. Because the Project emphasis was on the meanings of students' writings rather than surface features, readers were expected to refrain from including punctuation and spelling in the evaluation. Rather, drawing on theory and their past experience in scoring papers, the readers considered the following as criterion for judgment: writers' ability to write fluently with specificity and organization; textual logic, meaningful sequence, and cohesiveness. An amusing way to illustrate readers' requirements for fluent, organized and specific writing is to give an example of what it is not:

> So she went into the garden to cut a cabbage leaf to make an apple pie: and at the same time a great she-bear coming up the street pops its head in the shop. "What! no soap!" so he died and she very imprudently married the

barber and there were present the picninnies, the joblillies, and the garcelies, and the great panjandrum himself, with the little round button at the top, and they all fell to playing the game of catch-as-catch can, till the gunpowder ran out the heels of their boots. (S. Foote, 1954, as cited by Cooke, 1902, and quoted from Oller, 1983, p. 12.)

In Bruner's terms, readers expected to look at species minimum, communicative competence, and analytical competence in the writings. These three levels were seen as moving toward context-free elaboration: species minimum – language related only to the here and now, the events in the present time frame, such as "who" is responsible for an event, "who" received the action, or the location of the action; communicative competence – the ability to write discourse appropriate to the context in which they occurred, to comprehend and write of events in the present, past, or future time frames; and, analytical competence – the use of propositional thought processes independent of direct experience with objects or events (1975).

Data for the holistic sample came from students' first writing on the Electronic Schools Bulletin Board, an introduction of themselves to the system and a last entry, a requested, descriptive, piece of writing.

## 2. The Mean Number of T-Units

Hunt's Terminal Unit (T-Unit), or Loban's "communication unit," was both a syntactic and semantic consideration of text and an accepted measure of complexity and fluency (Loban 1976; Heath and Branscombe, 1985; C. Cooper, 1984). Cooper suggested use of this measure as the "standard unit" for the analysis of non-professional writings.

> The mean length of a novice writer's sentences is often inflated either by overcompounding or by orthographic sentence-punctuation errors...Mean T-Unit length overcomes these problems since it is derived by segmenting a paper into a sequence of independent assertations (clauses) breaking compound sentences into two T-Units and ignoring the requirements of conventional sentence orthography (p. 27).

T-Unit analysis provided a way of looking at the complexity and specificity of the students' writing by centering on the meaning rather than surface characteristics of that writing. Because it adjusted for length of entry, the mean T-Unit was superior over length of line, or length of text, counts and was useful as an index in computing average number of descriptive functions and features in the writing.

Each T-Unit was judged as one complete thought unit. These were, following Loban (1976), "either independent grammatical predictions or answers to questions which lack only the repetition of the question elements to satisfy the criterion of independent prediction" (p. 105). The following example from a student Electronic Mailbox illustrates the division of these units. Each line indicates one unit with lines indented which are running more than the width of the printing.

1) Hear that Archie is very lonely and want to hear from someone so I decided to write to him

2) Poor Archie who is trapped inside the Deafnet computer

Note the first unit was not separated after the word someone; without the remainder of the sentence, the essential meaning is eliminated. The subordinate clauses (so I decided to write to him) was a part of the independent prediction. However, a compound sentence which could be separated without the above loss of meaning became two units, as illustrated below.

1) I am fine

2) and I might as well introduce myself.

A compound predication with the same subject became one communication unit, such as:

1) I like to use and play with the computer.

In making decisions for dividing text into units, the above was used in conjunction with the following guidelines.

- Mazes (incomprehensible sections) and words which were obviously typographical errors were eliminated. In addition, student struggles with the electronic terminal were ignored (TXXX to) became the word (to).
- As above, when a student indicated a subject-verb pattern (I like a.....) and then types (I li.....) the entry was counted as two words (I like).
- All contractions were counted as two words. Abbreviations were counted as the word(s) represented.
- Sign-off names (R. Davis) were counted as two words.
- Paralinguistic devices (well...unhuh..) became a part of the following communication unit.

**Descriptive Methods**

Functions and features analysis was viewed as a step toward greater precision in describing text because it suggested an interaction took place between the writer and his, or her, reader. Further, through frequency counts, we expected to discover thresholds of use in both functions and features which would seem related to cognitive functioning related to the kind of context-free language looked at in the holistic sample, (i.e. dividing functions into the most and least frequently used lists as above and dividing the features into two sections: 1 and 2; 3 through 7). Frequency and variety counts were made to look at 16 functions we found in student writings and the 7 linguistic features we felt illustrated the students' cognitive processes.

Most functions can be expressed within one T-Unit, but more complicated ones may need two or more T-Units to express the thought. Likewise, two or more functions, or a combination of functions and features, may be expressed in the same T-Unit. "Do you have help week at library" is coded both as a request for general information and an indication of location.

**Functions**

The list of functions used to code student writings and their description is listed below. (Please see Appendix 7 for coding sample based on this list.)

1. Reporting and describing personal facts (or describing characters' feelings and situations, such as in a story). Coding was based on the meaning of the statement combined with the first pronoun in the T-Unit. Example: a. I like the music. (Note: "My mother likes the music" does not qualify for this category because mother is at a distance from self.)

2. Markers, openings and closings. These were the usual salutations in letters or story format ""once upon a time." Examples: a. Hi, Naheed; b. Bye for now; c. Your friend, CH.

3. Reporting and describing general facts (or facts at a distance from self or story character). This was based on the pronoun first used in the T-Unit. Examples: a. Last week, on Thursday, the girls' basketball won; b. This is a oral language school; c. My family went on vacation.

4. Requesting personal information (from another). Examples: a. Do you like bowling? b. What grade are you in?

5. Directing or suggesting. Example: a. Please write me back.

6. Explaining or justifying. This category was almost always accompanied by either a #1 or #3 designation and sometimes in-

cluded an agreement or provision of some clarification. Example: a. Bye for now because two of my friends are waiting to write their own.

7. Reporting opinions (or promising). Examples: a. I like miss Bede; b. I like to play tennis; c. I told you we went to Florida – the place is beautiful.

8. Predicting. Telling what the writer thinks may happen. Example: a. ....are planning to see the fall near Canada.

9. Requesting clarification, asking questions or giving a suggestion that further information would be interesting to the writer. Example: a. I would like to know more about the great wizard.

10. Wishing or hoping, an expression of desire. Example: a. I wish we could meet each other.

11. Thanking, or appreciation shown by the writer. Examples: a. Thank you for care Archie comics; b. Thank you for writing back.

12. Evaluating, showing that something is valued or measured against something. Examples: a. I like this place but I hate the cold weather; b. It was helpful for my homework.

13. Requesting opinion, asking for help or what the audience thinks about a topic. Examples: a. I am prepared to go high school next two fall: b. Let me know when you enjoy about this.

14. Requesting general information. Examples: a. What is the name of your team? b. Do you have help week at library?

15. Complaining. Example: a. You went swimming and left me here..when you come back we can fight.

16. Apologizing. Example: a. I am sorry I did not write back earlier.

**Features**

Because Odell (1977) indicated an analysis of particular linguistic features in writing that could serve as a measure of qualitative distinctions among texts, we undertook to code a series of particular features found in student writing. Used as an analysis tool in this study, we viewed these clues as indications of underlying cognitive structures expressed through language forms; they express thought and intentions in the service of function.

Items coded #4-6 (identified and illustrated below) were based on Odell's idea of contrast in which the writer constructs text based on a "chunk of experience." This included not only understanding what is, but what is not. As Odell maintained,

> ...contrast is operating when we make distinctions, when we have a sense of incongruity, or when we are aware of some disparity between appearance and reality, between what we hope, fear, wish to encounter and what we actually do (p. 111).

These are more completely illustrated in Appendix 6 in charts from Odell (1977). The series of linguistic clues we viewed as indicating certain intellectual operations on the writer's part were labeled "Features" in this study.

1. Time or sequence. an ordering could have been mention of date or time or use of such words as "before," "after," "later," "meanwhile," etc. Measurement was also included in this category, height, weight, length, etc. Examples: a. I am ten years old: b. What do you want for Christmas? c. Because I have not seen them for six years so I wanted to see them again.

2. Physical context, reference to a geographical location, such as a point on a map, place, street address, school, name of school, town, state country, store or the sensory property of a physical setting as "the smell of cooking..." Examples: a. I go to XXXXXXXX (school); b. We are going to Canada on vacation; c. I am going to Gallaudet next year.

3. Classification, mention of a classification title and particular instance, or (as in Odell (1977): sentences in which a linking verb is a subject with a predicate nominative, "She is tall"). Other clues are the use of phrases, such as: "for instance" or noun phrase and adverb forms of such words as similar and resembles. Examples: a. I am in the senior year at XXXXXX (school); b. I am in seventh grade; c. I am a senior; d. My favorite tennis players are Boris Becker...; e. My favorite sports are basketball, football...; f. I like music in school.

4. Cause-effect, or conditional statement, such as: if...then statements, "because," "therefore," "since" (not in the sense of time), "consequently." Examples: a. If you are able to come here we can go to the....; b. I like my school because I like sharing with my friends their experiences. (This is read as: Because I shared my friends' experences, I like my school.); c. If you are going to roller skate, then call Marty or Andy for more information; d. If you learn more language so you will find good job; e. My parents are very proud of me because I am interesting in reading.

5. Contrast through comparatives, use of such words as: "or"; "but," "however." Examples: a. Is your school a public or a private one? b. It is an oral school not a sign language school; c. But five girls like me played a lot (more) than others.

6. Contrast through negatives, use of "no," "without," "not," "never." Examples: a. I have never seen a parakeet; b. I like to play baseball indoors not outdoors; c. I do not believe you like wearing your hearing aid.

7. Contrast through comparative superlative forms, "more – most"; "less – least"; "er – est." Examples: a. I am taller than the other girls; b. This is sooner than that; c. I am sorry I did not write sooner. This is so late; d. You are five months older than me.

One additional contrast was coded, contrast through negative affixes, but because only two or three instances were found it will not be reported. This is, however, significant in that the use of the negative affix requires considerable linguistic elaboration.

Note: Features, and/or Functions are not exclusive. Any T-Unit may contain one or more of these.

## Analysis of Results

From the beginning of the Project in 1985 and its second year in 1987, we sought to answer the following questions: did students' writing change on measures of fluency, organization, and specificity; and, did students' writing change on measures of complexity and elaboration? The two primary techniques used to determine answers to these questions were: Holistic Scoring and the measurement of mean T-Unit.

During the two years of the Project, we attempted to keep types of writing as uniform as possible. Writings in the holistic pre- and post- sample were of a descriptive nature. Writings for the Electronic Mailbox, all letters, were similar in purpose and audience. Through these, students sought to communicate with each other or Project staff; requested their correspondent to write back, expressed personal thoughts or requested information related to their correspondent. The Electronic Schools Bulletin Board entries, though presumably revised and edited before being sent on the system, were usually of a descriptive nature.

For reporting purposes, the total student group was divided into four sub-groups according to disability and the frequency with which they used the electronic system. These four groups were: 1. Deaf High-Frequency users; 2. Deaf Low-Frequency users; 3. Mixed-Disability High-Frequency users; 4. Mixed-Disability Low-Frequency users.

## The Holistic Sample

The time lapsed between students' first entry (pre-sample) and their last (post-sample) ranged from a low of 5-8 months to a high of 24 months. The majority of students wrote the last entry approximately 12-14 months following their first entry. Most of these entries came from the Electronic Schools Bulletin Board with a few entries selected from descriptive letters.

Three evaluators trained in writing analysis at Rutgers University examined pre- and post-data. Two of the readers had extensive experience in scoring holistic samples for the Educational Testing Service examinations. One of these readers, a member of a community college English faculty, had managed her college's writing evaluation for a period of several years.

Two explanations were given readers: 1) Punctuation was eliminated from all texts when they were retyped into T-Units; and 2) readers were to ignore spelling errors because of student unfamiliarity with the terminal keyboards and the possibility of typing errors made when the material was segmented into T-Units.

Readers determined a six-point scale based on an anchoring sample of ten papers selected from students' other writings. These anchoring sample writings represented a range of writing abilities of the total sample. Reading these familiarized judges with the style and writing abilities of the students and provided an example of rating levels for the total sample. Each reader scored the ten papers; the anchor rating was accepted and assigned if all three scores were within two points. If they were not, a second reading was made to reach consensus. The evaluators' understanding of the anchoring procedure and the sample characteristics were so uniform that only one of the anchoring papers required a second review. (Please see Appendix 5 for Anchoring Sample.) Drawing on theory, the readers considered the writers' ability to write fluently with specificity and they looked for textual logic, meaningful sequence, and cohesiveness. In Bruner's terms, they looked for levels which illustrated species minimum language, communicative competence, and possible analytical competence.

Fifty-one pairs of papers were read and rated on the six-point scale. Individual student ratings for the Deaf High-Frequency users are shown according to disability in Table 27. Of these 21 students' papers, 17, or 80.95%, had higher ratings for Year II than for Year I. Four pairs of papers were rated at the same level

and no students' papers were rated lower the second year than the first.

**Table 27**
Deaf High-Frequency Users
Holistic Scoring: Individual Ratings for Year I and Year II

| Student Code | Score Year I | Score Year II |
|---|---|---|
| 105 | 3.5 | 4.5 |
| 106 | 3.0 | 4.5 |
| 401 | 4.5 | 4.5 |
| 402 | 4.5 | 5.0 |
| 404 | 3.0 | 5.0 |
| 405 | 3.0 | 5.5 |
| 406 | 4.0 | 5.5 |
| 407 | 4.5 | 5.0 |
| 408 | 4.5 | 5.5 |
| 410 | 4.5 | 5.5 |
| 411 | 4.5 | 5.5 |
| 413 | 3.5 | 4.0 |
| 504 | 3.5 | 3.5 |
| 506 | 3.5 | 5.5 |
| 507 | 2.5 | 2.5 |
| 511 | 2.5 | 5.0 |
| 512 | 3.5 | 5.0 |
| 705 | 3.0 | 3.0 |
| 714 | 1.5 | 2.0 |
| 801 | 3.5 | 5.0 |
| 802 | 4.5 | 5.0 |

(D-high, N = 21)

For the Deaf Low-Frequency user group, papers of 10 students were rated higher the second year, or 62.5%; papers of four students were rated the same, or 25%; and papers of two students showed decreased ratings the second year, or 12.5%. The individual ratings for this group are shown in Table 28.

**Table 28**
Deaf Low-Frequency Users
Holistic Scoring: Individual Ratings for Year I and Year II

| Student Code | Score Year I | Score Year II |
|---|---|---|
| 102 | 2.0 | 2.5 |
| 103 | 2.0 | 4.0 |
| 204 | 2.5 | 2.5 |
| 206 | 2.0 | 3.5 |
| 207 | 3.5 | 3.0 |
| 209 | 2.0 | 3.0 |
| 403 | 2.5 | 3.5 |
| 409 | 4.5 | 6.0 |
| 501 | 2.5 | 2.5 |
| 502 | 4.0 | 6.0 |
| 508 | 2.5 | 3.0 |
| 510 | 2.5 | 4.0 |
| 704 | 2.0 | 2.0 |
| 707 | 2.0 | 2.0 |
| 710 | 2.0 | 2.5 |
| 713 | 2.0 | 3.0 |

(D-low, N = 16)

For the Mixed High-Frequency user group, papers of eight students were rated higher the second year, or 88.88%; papers of one student was rated the same, or 11.11%; and papers of no students showed decreased ratings the second year. The individual ratings for this group are shown in Table 29.

**Table 29**
Mixed High-Frequency Users
Holistic Scoring: Individual Ratings for Year I and Year II

| Student Code | Score Year I | Score Year II |
|---|---|---|
| 609 | 4.0 | 6.0 |
| 611 | 2.5 | 4.0 |
| 903 | 3.0 | 3.5 |
| 908 | 3.0 | 3.0 |
| 1101 | 2.5 | 4.0 |
| 1106 | 2.5 | 3.5 |
| 1107 | 2.5 | 3.5 |
| 1108 | 3.0 | 5.0 |
| 1109 | 3.5 | 4.0 |

(M-high, N = 9)

For the Deaf Low-Frequency user group, papers of all but one of the five students were rated higher the second year, or 80%; none of the ratings remained the same; and papers of two students showed decreased ratings the second year, or 20%. The individual ratings for this group are shown in Table 30.

**Table 30**
Mixed Low-Frequency Users
Holistic Scoring: Individual Ratings for Year I and Year II

| Student Code | Score Year I | Score Year II |
|---|---|---|
| 601 | 3.5 | 2.0 |
| 604 | 3.0 | 4.0 |
| 608 | 3.0 | 3.5 |
| 613 | 1.5 | 3.0 |
| 1104 | 2.5 | 3.0 |

(M-low, N = 5)

The readers concluded that over 50% of the students had made progress in writing ability during the two years of the Project. Of the group, 43, or 66% of the students increased their

ratings; nine students, or 13.84% had the same rating for pre- and post-data; and six students, or 9.23%, of the group had decreased ratings. This is shown in Table 31, below.

**Table 31**
Holistic Writing Change: Year I to Year II
Number of Students with Rating Changes

| Change | Number | Percent |
|---|---|---|
| Ratings Increased: | 43 | 66.15% |
| Ratings Remained Static: | 9 | 13.84% |
| Ratings Decreased: | 6 | 9.23% |

(D-high, N = 21; D-low, N = 16; M-high, N = 9; M-low, N = 5)

Mean group ratings based on disability and frequency of use indicate that those students who used the system more frequently had higher ratings on the holistic sample at Year II compared with Year I. The change based on the group ratings for Deaf High-Frequency and Low- Frequency and the Mixed High-Frequency and Low-Frequency is shown in Table 32.

**Table 32**
Mean Group Ratings for Holistic Scoring

| Group | Pre-Sample Rating | Post-Sample Rating |
|---|---|---|
| Deaf High-Frequency Users | 3.19 | 4.66 |
| Deaf Low-Frequency Users | 2.31 | 2.53 |
| Mixed High-Frequency Users | 2.94 | 4.00 |
| Mixed Low-Frequency Users | 2.50 | 3.00 |

(D-high, N = 21; D-low, N = 16; M-high, N = 9; M-low, N = 5)

Caution should be taken in considering these results. By nature, pre- and post- holistic samples are merely two examples of students' writing over the two years. It is usually considered necessary to look at a group of samples from one person, as we have done in the T-Unit analysis and descriptive portion of the evaluation, to make judgments about writing change. It is possible other writings from these students might have shown more, or less, growth. However, these *were* Electronic Schools Bulletin Board entries and students were expected to "do their best," to edit and revise their submissions.

### T-Unit Analysis

All student writings during the two years of the Project were retyped and segmented into T-Units according to Loban's method of identifying Communicative Units (1976). The number of T-Units were then divided to yield an average, or mean, T-Unit score.

It should be noted that letters frequently will contain more T-Units of shorter length than Electronic School Bulletin Board entries are likely to have. This is because many students used the usual salutations and endings one would expect to find in letter-writing. In lumping both Mailbox Letters and Electronic Schools Bulletin Board entries together, it is possible that those students who wrote mostly letters will have a lower score. This is most likely to occur among the Mixed Low-Frequency group who wrote many letters to a staff member assigned to write with them and few, or no, Electronic School Bulletin Board entries.

Results were substantive. Three of the four groups (Deaf: High- and Low-Frequency use and Mixed-Disability: High-Frequency use) showed gains. However, for the fourth group, Mixed-Disability Low-Frequency use, the data shows no gain. These results are suspect because this group was limited in number (N = 5), these students wrote so infrequently, and, as discussed above, their entries were mainly short letters to a staff member. Results are shown in Table 33.

**Table 33**
Mean T-Unit Scores: Totals for Sample Sub-Groups

| Disability Group | Mean T-Unit | |
|---|---|---|
| | Year I | Year II |
| Deaf High-Frequency Users | 7.03 | 7.70 |
| Deaf Low-Frequency Users | 3.50 | 7.41 |
| Mixed High-Frequency Users | 4.06 | 5.82 |
| Mixed Low-Frequency Users | 6.22 | 5.58 |

(D-high, N = 21: D-low, N = 16; M-high, N = 9: M-low, N = 5)

Individual means for each group showed greater complexity and elaboration as indicated by T-Unit counts from Year I to Year II. For the Deaf High-Frequency group, 13 of 21 showed improvement, or 61.90% In the Deaf Low-Frequency group, ten of 16 showed improvement, or 62.50%. In the Mixed-Disability High-Frequency group, six of nine made improvement, or 66.66%. In the Mixed-Disability Low-Frequency group; only four of five students showed improvement, or 80%. Thus, between 61% and 80% of the students made some improvement in terms of average words per T-Units. These changes are indicated in Tables 27-30, which present data for the number of words at Year I and Year II; number of T-Units Year I and Year II; and T-Unit averages for Year I and Year II.

**Table 34**
Deaf High-Frequency Users
Words; T-Unit; Mean T-Unit: Individual Scores

| Individual Student Code | Number of Words | | Number of T-Units | | Mean T-Unit | |
|---|---|---|---|---|---|---|
| | Year I | Year II | Year I | Year II | Year I | Year II |
| 105 | 3295.00 | 6142.00 | 450.00 | 760.00 | 7.32 | 8.08 |
| 106 | 4313.00 | 8055.00 | 502.00 | 928.00 | 8.59 | 9.28 |
| 401 | 861.00 | 1232.00 | 111.00 | 166.00 | 7.76 | 7.42 |
| 402 | 1845.00 | 2657.00 | 207.00 | 334.00 | 8.91 | 7.96 |
| 404 | 1408.00 | 4312.00 | 140.00 | 439.00 | 10.05 | 9.28 |
| 405 | 394.00 | 1045.00 | 54.00 | 154.00 | 7.30 | 6.79 |
| 406 | 1187.00 | 1251.00 | 150.00 | 169.00 | 7.91 | 7.40 |
| 407 | 4623.00 | 2772.00 | 790.00 | 322.00 | 5.85 | 8.45 |
| 408 | 1375.00 | 4301.00 | 200.00 | 544.00 | 6.88 | 7.76 |
| 410 | 4398.00 | 4812.00 | 466.00 | 524.00 | 9.44 | 9.18 |
| 411 | 840.00 | 333.00 | 93.00 | 333.00 | 9.03 | 9.42 |
| 413 | 488.00 | 2729.00 | 293.00 | 406.00 | 8.49 | 6.72 |
| 504 | 1251.00 | 109.00 | 165.00 | 23.00 | 7.58 | 4.74 |
| 506 | 3984.00 | 733.00 | 393.00 | 72.00 | 10.14 | 14.05 |
| 507 | 2795.00 | 2128.00 | 389.00 | 260.00 | 7.19 | 8.18 |
| 511 | 1538.00 | 1407.00 | 207.00 | 94.00 | 7.43 | 14.96 |
| 512 | 1196.00 | 3742.00 | 189.00 | 502.00 | 6.33 | 7.45 |
| 705 | 349.00 | 2174.00 | 74.00 | 359.00 | 4.72 | 6.06 |
| 714 | 375.00 | 692.00 | 88.00 | 123.00 | 4.26 | 5.63 |
| 801 | 746.00 | 1243.00 | 101.00 | 155.00 | 7.39 | 8.02 |
| 802 | 3928.00 | 1574.00 | 797.00 | 271.00 | 4.93 | 5.81 |
| Avg | 1961.38 | 2544.90 | 279.00 | 330.38 | 7.50 | 8.22 |
| Mean T-Unit | 7.03 | 7.70 | | | | |

(D-high, N = 21)

**Table 35**
Deaf Low-Frequency Users
Words: T-Unit; Mean T-Unit: Individual Scores

| Individual Student Code | Number of Words | | Number of T-Units | | Mean T-Unit | |
|---|---|---|---|---|---|---|
| | Year I | Year II | Year I | Year II | Year I | Year II |
| 102 | 73.00 | 2085.00 | 682.00 | 255.00 | 6.82 | 8.70 |
| 103 | 470.00 | 364.00 | 51.00 | 31.00 | 9.21 | 11.74 |
| 204 | 47.00 | 477.00 | 14.00 | 80.00 | 3.36 | 5.96 |
| 206 | 82.00 | 642.00 | 7.00 | 86.00 | 4.82 | 6.42 |
| 207 | 79.00 | 660.00 | 19.00 | 96.00 | 4.16 | 7.25 |
| 209 | 117.00 | 301.00 | 30.00 | 58.00 | 3.90 | 5.18 |
| 403 | 537.00 | 616.00 | 64.00 | 80.00 | 8.39 | 7.70 |
| 409 | 135.00 | 751.00 | 19.00 | 89.00 | 7.11 | 8.43 |
| 501 | 462.00 | 265.00 | 82.00 | 53.00 | 5.63 | 5.00 |
| 502 | 1472.00 | 929.00 | 136.00 | 88.00 | 10.82 | 10.56 |
| 508 | 97.00 | 310.00 | 15.00 | 49.00 | 6.46 | 6.33 |
| 510 | 508.00 | 445.00 | 96.00 | 71.00 | 5.29 | 6.26 |
| 704 | 346.00 | 70.00 | 64.00 | 14.00 | 5.41 | 4.07 |
| 707 | 43.00 | 110.00 | 9.00 | 19.00 | 4.78 | 5.26 |
| 710 | 139.00 | 110.00 | 31.00 | 25.00 | 4.48 | 4.40 |
| 713 | 200.00 | 199.00 | 45.00 | 31.00 | 4.44 | 6.42 |
| Avg | 300.44 | 520.88 | 85.88 | 70.31 | 5.94 | 6.86 |
| Mean T-Unit | 3.50 | 7.41 | | | | |

**Table 36**
Mixed High-Frequency Users
Words: T-Unit: Mean T-Unit: Individual Scores

| Individual Student Code | Number of Words | | Number of T-Units | | Mean T-Unit | |
|---|---|---|---|---|---|---|
| | Year I | Year II | Year I | Year II | Year I | Year II |
| 609 | 298.00 | 901.00 | 32.00 | 140.00 | 9.31 | 6.44 |
| 611 | 34.00 | 728.00 | 11.00 | 123.00 | 3.09 | 5.92 |
| 903 | 293.00 | 438.00 | 87.00 | 77.00 | 3.37 | 5.66 |
| 908 | 234.00 | 455.00 | 34.00 | 57.00 | 5.71 | 2.05 |
| 1101 | 359.00 | 982.00 | 68.00 | 181.00 | 5.27 | 5.43 |
| 1106 | 2836.00 | 5624.00 | 584.00 | 1005.00 | 4.86 | 5.60 |
| 1107 | 307.00 | 935.00 | 87.00 | 242.00 | 3.53 | 4.07 |
| 1108 | 1097.00 | 3816.00 | 160.00 | 537.00 | 6.86 | 7.11 |
| 1109 | 896.00 | 873.00 | 501.00 | 180.00 | 5.01 | 4.85 |
| Avg | 706.00 | 1644.67 | 173.78 | 282.44 | 5.22 | 5.24 |
| Mean T-Unit | 4.06 | 5.82 | | | | |

**Table 37**
Mixed Low-Frequency Users
Words: T-Unit: Mean T-Unit: Individual Scores

| Individual Student Code | Number of Words | | Number of T-Units | | Mean T-Unit | |
|---|---|---|---|---|---|---|
| | Year I | Year II | Year I | Year II | Year I | Year II |
| 601 | 178.00 | 106.00 | 17.00 | 24.00 | 10.47 | 4.41 |
| 604 | 52.00 | 311.00 | 13.00 | 58.00 | 4.00 | 5.36 |
| 608 | 40.00 | 309.00 | 4.00 | 52.00 | 7.50 | 7.26 |
| 613 | 81.00 | 148.00 | 16.00 | 21.00 | 5.06 | 7.00 |
| 1104 | 402.00 | 75.00 | 71.00 | 15.00 | 5.66 | 5.00 |
| Sum | 753.00 | 949.00 | 121.00 | 170.00 | | |
| Mean T-Unit | 6.22 | 5.58 | 5.45 | 4.84 | | |

# Descriptive Text Analysis

## Functions Used by Students

All writings were coded to show the number and variety of functions that students expressed in their writings. (Please see Coding Example in Appendix 3.) The number and variety of linguistic expressions which indicated the writers' intention to inform, request, thank, evaluate, and so on counted. At the start of year one of the Project, we looked for functions which might be similar to those found in an examination of the writings of English as a Second Language students in a study made by Roger Shuy (1984). These were reordered according to the frequency of use during the first year and one function, apology, was added to correspond with those found in these students' writings. At the end of the second year, one function, requesting academic information, was eliminated because of disuse. This left a total of 16 functions which were very roughly ordered according to the frequency of use by students. Of these, the ones most often used were the first five plus numbers 7, 10, 11, and 16. These are listed, as: 1. Reporting and describing personal facts; 2. Social greetings or closings or conventions, such as a story title; 3. Reporting or describing general facts; 4. Requesting personal information; 5. Directing, or suggesting action, on the part of others; 7. Reporting opinions; 10. Wishing or hoping; 11. Thanking or showing appreciation; and, 15. Apologizing.

As Shuy suggested, some of the functions seemed more complex, and these the students did not use as frequently. These were: 6. Explaining and justifying; 8. Predicting; 9. Requesting clarification; and, 12. Evaluation.

A time frame emerged in the frequency of use of functions by these students which is similar to the acquisition of a concept of time by a young child. That is from writing about things in the present, to events in the past, to writing about future events and speculating about events in the future. The functions used most frequently by students roughly followed this time frame.

Figures for the increase in the use of functions from Year I to Year II are not surprising because linguistic function relates to the content of what a student wants to say. This obviously changes according to the writer's purposes and should not show a growth or developmental progression except in the use of the more complex functions of explaining, justifying, predicting or evaluating. There was no appreciable difference in group mean

number of functions used; however, maximum magnitude of change for groups ran from 12.50% to 70%. Percentage data for individuals within groups showed that 42.85 of the Deaf High-Frequency group increased the number of functions used; 56.25% increased the number of functions used in the Deaf Low-Frequency group; 66.66% increased the number of functions used in the Mixed High-Frequency group; and results for the Mixed Low-Frequency group (one out of five) were 25%. Slight gains can be seen in the variety of functions used by students; reported in percentage of the total number of functions (16) each group except the Mixed-Disability Low-Frequency group used a greater variety of functions during the second year of the Project.

## Features Found in Student Writings

On the Electronic Schools Bulletin Board, topics students chose to write about was of interest to us because it indicated the writer's focus for the text. In the first year, many students' letters "chained"; that is, the writer went from one to another topic in the apparent hope of interesting a pen pal. These early letters often started with the student's name, his school, where he or she lived, the number of disabled people in his or her family, where his or her home was located, if the student was at boarding school, and sports or classes preferred. Later letters became more focused on one or a developing topic. Examples of these two types of letters comes from two students. Student 409, whose letter is an example of the first type of letter, wrote in October 1986:

> My name is xxxxxxxx xxx. I am eighteen years old and 6 feet
> and 2 inches tall. I am hearing impaired.
> I wear stylish clothes, And I am a little preppy.
> I live in xxxxx xxxxx. I have one half sister
> She is 15 years old and liveS with my Father.
> I go to xxxxx school in xxxxxxxxxxxxxxxxxxxxx.
> This is my second year at xxxxxxxxxxx(school).
> I am going to graduate this year.
> My hobbies are soccer and reading.
> I love to play a variety of sports.
> All my family will come to see my graduation.
> My Great-Grandmother is coming to see my graduation, too.
> She is about ninety-eight years old,
> And she is very healthy. After I graduate from
> high school I will go to college
> to learn to build my own business.
> In the future I would prefer to live in Rhode Island.
> I really want to buy a huge sail boat.
> And I hope to travel around the world which will be fun.

An example of a more focused letter came from student 408 in the middle of the second year. She wrote on two main topics, about herself and made requests for information from her correspondent.

> xxxxxx. Hello xxxxx
> I am glad that you wrote me back
> I was please to hear form you again
> So how have you been doing so far? I am just great.
> I am totally happy that Christmas is coming up really soon.
> Of course I will go Christmas shopping all day with
> my friends. Do you like to go shopping? I do.
> I love to go shopping and buy some neat clothes.
> It is kind of fun. I bet you do not like to go shopping.
> You just like to hang around with your friends.
> Right, xxxxx?
>
> I am curious about you.
> I want to know what do you look like.
> Describe yourself in the next letter.
>
> I will tell you what I look like.
> I have brown hair and blue eyes.
> I am about five feet and five 1/2 inches tall.
> I am a talkative person.
> I love to talk to people especially my friends.
> I am not a shy and quiet person.
> I love to play basketball, go skiing, and especially
> swimming. I have been on the basketball team for three
> years And I have been in the swimming team since
> I was six years old. I also like to dress preppy and sort
> of fashion.
> What about you? Please tell me on the next letter.
> Thanks for writing me back.
> Please write back to me as soon as you can.
> I am waiting to hear from you again. Your friend, xxxxx xxxxxx.

Topics of pieces written for the Electronic Schools Bulletin Board were more focused as can be seen from some of the examples which follow. The topics of Peace; Space Shuttle Disaster; Kadaffi; Americans and Lybians were some of these from a world-wide framework. One example of reaction to a world or national event was:

> ...I think the explosion of the shuttle was terrible. I was really shocked after the principal announced in the loudspeaker. She said we would have one minute of silence. We did, thinking about the explosion. After that, we turned on the TV and listened. I find it unbelievable. And it still is. I hope they are very happy when they touch the face of God.

Other topics on which students wrote for the Bulletin Board during the two years were: Sports; A Flood; Driver Education; Breakfast; My Job; We Want to Hear From You; Olympics Performance; Smoking; Dorm Life; Virgin Island Trip; Summer Job; Seasons; Where I Like to Live; Spring Vacation; Stories; My Operation; Drinking and Driving; Exercise; Putting the New Tank in for Mrs. Murphy; Clubs; Holidays; My Best Friend; Annual Tree Planting; Space Rocket; School Life; My Science Teacher; Airplane Hijacking; Beach; Statue of Liberty; My Hometown; Television Show; and Dreams.

As can be seen from the list of topics, students wrote about their personal lives at school, or home, events. Another theme that ran through their writings involved the students coming to terms with their disabilities. One mixed-disability student wrote about a new friend and the fact that the friend "liked my body." Read out of the context of the disability, this might have other meaning; but, here it seemed an expression of acceptance. For the deaf students, the same theme of acceptance of hearing loss was evident. Students commented about whether the members of their family were, or were not, deaf; when they themselves, became deaf; and the movement out of their family into institutionalized living because of deafness. One student wrote about being told she was going to a boarding school and another wrote about her first experiences in a dormitory situation.

> When I was 12 years old I came to XXXX School for the Deaf in 1981. I was so scared to live in the dorm. I had never slept in the dorm (also) or had never been without my family.
>
> I met many new friends who were deaf. I was homesick because I missed my friends (family) and friends. I got in a lot of trouble with housemothers. I mean I always was fresh to housemothers and they gave me some punishments. I always was fighting with friends at xxxxxx Hall. I was very upset that the girls hurt me and won't let me be their friends.
>
> So for a long time I changed my personality to be more comfortable with deaf people. I never met a lot of deaf people around my hometown and just a few deaf friends at my old school. It was a public school and it had a small program for deaf students. I used sign language. Xxxxxx School was first oral school for me. I met new classmates and my new classmates were only five boys and no girls. I felt bad that I was only girl in my class. Sometimes, well most of the time, I did not understand the teachers. All subjects were different from my school. I learned a lot and history and science were new for me....

Students who were deaf also wrote stories in which hearing people had to depend on a deaf person or where everyone on the planet was deaf. One activist student wrote a letter to President Reagan in support of programs for the deaf. One wrote about being a deaf patient in the hospital:

> Being a deaf patient at the hospital can be tough because you can not hear anything. You wanted to be able to understand what the doctors tell you about your physical problems and what they will do to you. You, the deaf person have the right to ask for an interpreter, a closed caption cable, and a TTY, too. The hospitals should provide all those things including paying the interpreter for doing their job. ...I did not know what was wrong with me until after the operation..Few days later after the operation I feel a lot better. And the doctor came in the room with an interpreter...and told me what they did and what they will do with me for a couple of months. ...They also have TTY, too, but I brought my own TTY. Those things have kept me busy and able to cope as well as hearing patients...

Beyond topic, the seven features coded were: 1. Time sequence, or measurement; 2. Physical context, or location; 3. Classification; 4. Cause-effect, or conditionals; 5. Contrast by comparative; 6. Contrast by negative; and 7. Contrast by comparative superlative. An 8th feature, contrast by negative-affixes, was eliminated because there were very few instances of use. This is not surprising because this feature is a more mature linguistic feature. Most frequently used features were numbers 1 and 2. It is very difficult to talk about anything without putting it in a location and time frame. Further, many students felt compelled to start letters with "I am a student at XXXX High School in XXXX" which raised this count. Because the linguistic forms to express features 1 and 2 were less elaborating, the remaining feature of classification and contrast were counted in the presentation of frequency count per T-Unit. Classification was included in this smaller group of features because of its close tie to language use (Davis, 1975) and the remaining contrasting features (comparison, conditional, negative, and ordering) are considered expressions of more complex functioning. Scarcely any changes are found in number of features in any of the sub-group though there were differences between sub-groups. This may be because features are of such a fundamental nature they are likely to remain fairly stable over a two-year period.

The results of the number of features numbered 3 to 7 used in each group shows virtually no changes with the exception of slight gain in the Deaf Low-Frequency user group. Individual students did show gains: in the Deaf High-Frequency group 33.33%

increased the number of features used in Year I over Year II: 81.25% of the students in the Deaf Low-Frequency group showed gain; 33.33% of the Mixed High- Frequency group and 60% of the Mixed Low-Frequency group showed gain.

The variety of the seven features used by each student is shown in percentages of the more complex features 3-7. There was slight decrease from Year I to Year II in the Deaf High-Frequency group. Individuals within the group did have positive changes; a change from 50.43% to 65.15% in the Deaf Low-Frequency group; a change from 68.25% to 80.95% for the Mixed High-Frequency group; and from 40.48% to 47.62% for the Mixed Low-Frequency group. Keeping in mind the subjective nature of this measure, it is possible that the Deaf High-Frequency group "topped-out," or was at a point where increase as a group slows down. In fact, that seems to have happened as nearly half the students in this group used all 7 features in both years. The 7 features coded are close to the order of indicated use by students.

Functions and features analysis seems to be a step toward greater precision in describing text because it suggests an interaction takes place between the writer and his, or her, reader. Further, through frequency counts, thresholds of use in both functions and features which seem related to cognitive functioning were illuminated. (i.e., dividing functions into the most and least frequently used lists as above and dividing the features into two sections: 1 and 2; 3 through 7.)

The perspective on intentions of the writer led us to see the students' text as their desire to write something within their own cognitive understanding which would be received knowingly by a reader. That is, would inform, incite, or persuade the reader to action. When a student with communicative competence wrote to President Reagan to lobby for programs for the deaf, she was trying to persuade him to her point of view. When she suggested hospitalized deaf patients were entitled to special services she informed them of their rights and gave an example of how the system worked for her. Likewise, a student at a lower elaboration level sought to elicit correspondence by telling where he or she went to school, what sports, or classes were preferred. In this elaboration we saw levels similar to those suggested by Bruner: species minimum, communicative competence, and some at the analytical competence level. In addition, when we looked at the students use of functions we could see a time frame emerge which fits in with these levels. As Bruner suggested, a most obvious

quality that moves writing from species minimum to more complex levels is context-free elaboration. This Project gave students an opportunity to practice and use language that was not context-related. In our Project, we asked students to communicate with others through the medium of the computer, a long distance audience which only gradually became familiar. Students, we might add, dealt rather well with this problem, but it is not surprising that the frequency of functions and features used were mainly less complex levels. The infrequently used functions (numbered 6, 8, 9, and 12) and the features numbered 3 through 7 seem to tap more of the communicative competence level suggested by Bruner.

**Writing to a Mature Writer**

Additional descriptive questions we had regarding student writing concerned the effects of students' on-going writing with a mature correspondent and the differences that might be found between students' letters and their revised text for the Electronic Schools Bulletin Board. Data related to these questions follows illustrated by text and mean T-Unit scores.

Every student throughout both years in the Project, had the opportunity to write to any of the adults who were concerned with the Project. At the end of the first year, we detected some differences when a student wrote to a teacher at the college she hoped to attend in the future. During this first year, her entry was the only example of writing to an adult when the student was aware that the person receiving the letter was a mature writer. The fascinating thing about her letter to the teacher was the greater complexity and elaboration of the language shown by a larger mean T- Unit and a greater frequency in the use of functions and features than in other letters of the same month.

Analysis of the eleven letters the student wrote during one month, not including the letter to a teacher written during the month, is provided on the following page.

**Table 38**
Mean T-Unit Scores for Letters to Peers
Comparison with Letter to a Teacher

| | 11 Letters in March (of 12 Letters – Teacher Letter Omitted) | Letter to a Teacher |
|---|---|---|
| Mean T-Unit | 8.23 | 12.03 |
| Mean Number of Functions | 12.09 | 21.00 |
| Mean Number of Features | 2.63 | 13.00 |

Selected examples from this student's letter writing during this month are below. The first was written to a peer known by the student; the second to an unknown peer; and the third to a teacher who was not known by the student. (These examples and the others which follow were all re-typed with punctuation added.)

**(Letter to an Unknown Student)**

Hi. This is Xxxxx Xxx from Xxxx.
I am a senior in a Xxxxxx mainstreamed school. I am going Xxxxxx (college) in August. I would love to be your penpal. Write soon.
From X. Xxxxx

**(Letter to a Peer Known by the Writer)**

Hi. This Xxxx.
It has been a long time since I have heard from you. How are you doing lately? I am doing very well. I am graduating June 28th. If you have not heard, I am going to Xxxx (college) in August. This college is for Xxxx students only. I really can't wait to go to college. I really need a change of pace.
How is life where you live?
I am just learning to type so please excuse any spelling errors. Hope to hear from you soon.
Your friend, Xxx Xxxxxx.

**(Letter to a Teacher Unknown to the Writer)**

Hi. This is Xxxxx Xxxxxxx.
A penpal of mine named Xxxx Xxxxxxx told me that you work at Xxxxxx College as a teacher. I would really like to be more secured about myself when I go too Xxxxx in August. As you may or may not know what level I will be entering in, I will tell you. I am going to be a freshman trying out for the honor classes.
I am not a very athletic person. I love to read a lot and am a very studious student at school. I plan on eventually becoming a teacher for the xxxxx. I know xxxxxx language very well, however, I fear going to college because most of the kids there use xxxx (a different language). I mainly use Xxxxx xxxxx with xxxxx language. The way I xxxx is to include my verbs and use complete sentences.
Well, if you have any information on classes I might want to take or how I can be made to fit in better, I would really appreciate your help.
Also, my friend who takes special Xxxx xxxxx language class is teaching me new Xxxxx (language) so I will be even better xxxxx (language user).
Bye for now. My mailing box is X. Xxxxxxx.

At the time we did the analysis of these letters, we looked for explanations for the differences among them. This student was, on the whole, competent in writing. We felt that she attempted to communicate with others by trying to write in ways that would be understood. That is, we felt that what students write depended on their purpose for writing and that they Project the comprehension of the others by the knowledge they possess of the other's ability to understand. In writing to known students, the writer selected language according to her idea of the ability of the other student to read and understand her words. When writing to the teacher, she made a judgment about the teacher's position, or status, and her ability to comprehend.

In her writing to the unknown student, the writer needed to make a guess about the reader's ability to understand and, deliberately or unintentionally, she wrote accordingly. She wanted to introduce herself and may have felt that simplified, non-elaborated language was the safest route. Also, she may have been "fishing" because she did not have a great deal to say.

These differences in writing to various audiences brought to mind conversations held with Jana Staton regarding participants, writing in dialogue-journals. In Staton's experience, writing for the purpose of developing greater fluency, elaboration, and more specificty was not as effective between peers as between adults and students. That is, for the purposes of writing development, peer writing was not as effective as writing between students and more mature writers who could provide a model for the student.

Because of our thoughts about the above student and her writing to different audiences, one staff member in the second year was assigned to elicit and respond to letters from students who were not otherwise receiving much peer correspondence. Most, but not all, of the students with whom the staff member corresponded were less able to express their thoughts in writing than the other students. We hoped that an on-going correspondence with a mature writer might extend their progress. Further, we thought the more focused attention of an adult could motivate these students to increase the number of letters they wrote. Clearly it was motivating. Some of the more frequent writers were among this group. These often were short letters, but their correspondence was on-going throughout the year. These students shared their lives with the staff member, gave her suggestions for caring for pets or other problems which emerged as they corresponded.

Some examples of these on-going letters follow. As in all examples in this section, punctuation and format were added in retyping. The student's text was italicized for reference to prior topics or when the student provided information the staff member requested.

The first series of letters illustrate the interaction between the two writers. Both writers in the correspondence asked for information at the start as a means of becoming acquainted.

All of the student's first letters begin without salutation. By February. the mature writer's model seems to take hold ("Dear XXXX"); or, perhaps, the classroom learning suggests the need for a salutation in the letter form. Regardless, the form disappears, and the student reverts to the more informal "Hi" which is closer to his way of verbally greeting a friend.

---

**(1106 A. November)**

Hi Xxxxx. I am fine. *To answer your questions: No, I do not have home box HBO or a VCR, but, I am getting a VCR hopefully soon.* How old your children? I would like a boyfriend who buys me diamonds, gold and fur, but I would not want a boyfriend right now. But, I would like one when I get older.
Bye for now, Xxxxx

**(1106 B. November)**

Hi Xxx. How are you. I am fine.
How was your weekend and what did you do? Saturday I had company, my cousins. We had a ball. We talked about boys and laughed. We had fun. And I had fun.
For dinner Saturday we had Chinese food.
*To answer your questions, I want a boyfriend who dresses nice, is clean, and looks good.*
Bye for now, Xxxx.

**(1106 C. November)**

Hi Xxx. How are you?
*About Thanksgiving, I am having company, my aunts and cousins. That sounds nice what you are going to do. You are lucky. Where are you going in Washington?* I went there when I was a little girl to visit my aunt. It was fun. I like to eat fried rice, McDonalds, Burger King, Beef Steak Charlies, and pizza.
Bye for now, Xxxx.

**(1106 D. February)**

Hi Xxxxx. How are you? What have you been doing?
*You are lucky that you are off this week.* I am not. We're not off this week. We have to come in school and work. You are lucky. How was your vacation? Was the weather nice? Did you enjoy yourself?
Bye for now, Xxxx.

**(1106 E.February)**

Dear Xxxxx. How are you? I am fine.
Our school was not closed Thursday and Friday, but it was closed on Monday. I did not come in for a week and a half because of the snow.
I got a pair of earrings and a chain and bracelets for Christmas. I love jewlery and like them very much. They are gold. I don't like plastic or silver. I only like gold and diamonds. I can't afford diamonds, but I still like them a lot. *Tweety and Eeety are fine.* They are fun, but we don't let them out of the cage because my little sister is ascared of them. *Yes, I think you should get another bird to keep it company. What is your bird's name? I am sorry I forgot you said its name was Rainbow.* That is a nice name.
I might be going to camp for the three weeks of July, but it is not definite yet. I hope that I could really go. *That camp your son went to sounds nice. How many weeks did he go for?*
Bye for now, take care, write back. Xxxxx.

**(1106 F. February)**

Hi Xxxx. How are you? I am fine.
*I am glad that you got Sunbreeze to keep Rainbow company. The idea of the seedtree sounds like it might work.* We still don't know if Eeety is pregnant or not. I will let you know.
How are your kids doing? I don't know for sure if I am going to camp, but I am hoping that I do.
Bye for now, Xxxx.

The next series includes the student's letters in which he shared information with two different staff members. The student began by thinking he was writing to another student in the Project. Along the way this was clarified. He originally wrote about the new computer program he was using and in 1108 B he responded to questions about it by referring to a difference in computers according to the time in which they are used. "The computer on Tuesday" inferred that he was not talking about the one the Project provided for him to write his letters and Bulletin Board entries. Later, he became more specific by mentioning the type of computer he had at home.

In 1108 F the student realized that his mention of Star Wars confused his correspondent and this was clarified when he wrote, "I meant the rocket placement that is called Star Wars II."

**(1108 A. December to S.G.)**

I am doing fine
What school do you go to? And what do you do there? I have been doing lots of things like working at school, playing card games...all sorts of things. I am presently starting to stay after school on Tuesdays. They have an after school program that I am enrolled in. We play all sorts of things on the computer. We do Printshop.
Bye for now. Xxxx.

**(1108 B. December to S.G.)**

Hi Xxxx. *My Thanksgiving was fine.* I went to my cousins. It was nice.
*As for the Printshop. It is a computer program that I do on the computer at school, not this computer.* The computer on Tuesday. It makes borders and pictures. When you are done it prints them out. Do you have a Printshop? If you do, send me some information on where to buy or rent it. I have a Commodore 64 at home and would like to use Printshop on it. Please write back soon. Xxxx.

**(1108 C. December to D.S.)**

*I have card games and all sorts of games*
*As for the computer store, I do not know if there is any around. The only thing that I know is around is the library. I will send my brother to the library to find out.*
*I went to Washington and it was crowded and it was also raining. I did not even get out of the car because there was not a place to park. How was your trip to Washington? Did it rain on you, too?*
Two years ago I met Mrs. Reagan. She was doing a spot for the telephone and I was picked to be interviewed by her. I went to the city with my parents to meet her. We talked to each other. And I liked it. My picture was in the paper. I was nervous when I met her. I talked about Starwars. I enjoyed it.
Bye for now. Xxxx.

**(1108 D. December to D.N.)**

*I do not have a favorite recipe*, but I do like to cook. I cook apple turnovers. If you would like the recipe, I can get it from my Mother. *As for the computer, I play all sorts of games on the computer.* I do not know how to play all the games that we have, but my brothers do.
Bye for now.
Xxxx.

**(1108 E. December to D.N)**

Hi Xxxx.
*As for the computer games*, the card game is my favorite. It is difficult to learn new games. That is why I only play the card game. *I did not say that my Mother had the recipe. My Mother's friend has the recipe. I will try and get it for you.* I also like to cook cake. I cook it with my Nanny in her country house.
Bye for now.
Xxxx.

**(1108 F. December to D.S.)**

Dear Xxxx.
*I did not mean the movie Starwars. I meant the rocket placement that is call Star Wars II. What did you see in Washington?*
Bye for now. Write back. Xxxx.

**(1108 F. December to S.G.)**

*As for Printshop.* It comes with a booklet that has pictures in in. The pictures have numbers and we pick the number of the picture we want. Then we type in the number of the picture we want. We can also pick a frame or border form the booklet. The computer does the rest.
I do not have any sisters. I do however have brothers, three. They do use the computer. They are able to do programs on the computer like Math Quiz. They also play games on the computer like Checkers and Dungans and Dragons. Do you have a computer?
Bye. Xxxx.

The next series centered on a topic familiar and motivating to all pet owners. The student began with the mature writer's new kitten and continued with suggestions for pet care and information about her bird and hamster. The adult posed a problem and received a response in 1109 C about the way to get a bird to fly out of its cage.

These letters, as were many others, were informal and in a verbal form without a standard letter salutation. Again, this student, did use the "Dear Xxxx," form once, but it disappeared again for the rest of the correspondence. The verbal mode is continued as this student closes two letters with "I will talk with you later."

**(1109 A. October to D.S.)**

Hi How are you?
*What do you want to name your kitten?* Usually you keep kittens in the house. My neighbor has a cat. You have to get cat litter.
That's all for now. Xxxxx.

**(1109 B. January to D.S.)**

Hi Xxxx.. How are you? I am good.
*I have a bird, too.* Its name is Prince. My father lets Prince out of the cage everyday when he gets home from work.
Goodbye. Have a nice day. Xxxxx.

**(1109 C. February to D.S.)**

Hi xxxx. How are you? I am fine.
*I think that hanging a seedtree by the cage door might work.* I would like to have another bird, but I have a hamster. My hamster's name is Cupcake. I take it out of the cage when I get home to play with it.

Over the weekend I would like to go shopping because I need a pocketbook. What are you going to do?
I will talk to you when you get back from your trip.
Bye for now. Xxxx.

**(1109 D. February to D.S.)**

Hi Xxxx. How are you? I am good.
Prince has to be pushed out of the cage and he flies out. Prince sits on top of his cage most of the time, but he does fly around a little. *Yes, I think you should get another bird for the cage.*
It will be Valentine's Day on Saturday. Happy Valentine's Day.
Bye for now. Write back. Xxxxx.

The student's growing fluency and ability to put ideas in writing was shown in the next series. Note that the first entry was nothing more than a quick expression of the students present state and a promise to write more. Both fragments in this first entry were without the personal pronoun "I" and there is no greeting, salutation, or closing, other than: "will write more later." The second entry provided more information, but the third paragraph begins again without the personal pronoun. In this entry, the student asked about a pen pal; and he told about his own out-of- school activities. He ended his first entry with "I would like to hear from others who have jobs and find out what they do."

In 609 C and D the student changed the topic from the out-of-school job by chaining from the job (to earn money) to providing information about his home and desire to be with his family. Entry 609 E illustrated more of this longing. Because of the poetic quality of this entry it is printed in a different format.

**(609 A. October to D.S.)**

Work very hard in School. Will write you more.

**(609 B. October to D.S.)**

Hello. I am Xxxx Xxxx. Do you have a penpal for me?
Mr. Hayes said you have penpals for us. I work in
workstudy at a nursing home.

My name is Xxx Xxxx. I would like to have some penpals.
Help the patient in the bed. You not suppose to smoke
in the patient's room. I work with the patient. I push
the wheelchair to move the patients to occupational

therapy exercise and special events.

I would like to hear from others who have jobs and find out what they do.

---

**(609 C. November to D.S.)**

*It home for old people. I take care of them every day during school.* I like working with patients. They are nice to me.

---

**(609 D. November to D.S.)**

Has anyone ever been down to the islands? My father will call me from there next week. I miss my father very much. I will like to see him. I would like to spend some time with him. He lives back home in Xxxxx on the island of Xxxxxx. My father works in a sugar cane factory there. He has a beautiful house in Xxxxxxx. I want a summer job so I can afford the money to go there. I work at the Xxxxxxx Nursing Home. I want to work there this summer, too. I miss him so much.

---

**(609 E. February to D.S.)**

I dream about horses.
The horses were running around in the field.
I see a man on a horse.
He was going for a ride.
And he had a cowboy hat on his heads.

I see birds flying around.
I see a cow.
She was eating the grass.
The man was putting cows in a truck.
He take the cows to the farm.
He feed the cows.
He give them milk.

Do you dream?
Tell me your dream, too.
Do you ever dream of far away?
I do a lot.

He is a wonderful man.
And he talk to people very nice.
And he respect other people.
And I dream about him a lot.

I dream he is watching television.
He is watching news.

He have company, too.
They are all drinking wine.
They start to laugh and fool around.
My father rides out on his bicycle and does tricks.
I miss Xxxxxx after these dreams.

The above series of letters from students writing to mature writers illustrated some of the ways they were able to move into more fluent communication with adults. Although these were "letters" they were most often written in a verbal format much like the talk in a telephone conversation. The mature writer provided models of form which may have been taken up and discarded by the students as irrelevant to their needs. They did pick up on the adult's model of requesting and clarifying information.

In each series, text was taken up in becoming acquainted with the correspondent and as the writing progressed more and more practical and personal, and even, poetic information was shared.

Does writing to a mature writer make a difference? We can point to some gains in terms of mean T-Units of those students who wrote to mature writers. While these gains were not statistically significant, students who wrote to adults regularly did have higher mean T-Unit scores. These are shown below.

**Table 39**
Comparison of Group Means: T-Units for All Writings Between Students Writing to Mature Writers and Those Who Wrote Only to peers at Year II.

| Student Group | Students Writing 3 or More Times to Mature Writer. | Students Writing Letters Only to Peers or Less Than 3 Times to a Mature Writer. |
|---|---|---|
| Deaf High-Frequency Users | 10.17 | 8.85 |
| Deaf Low-Frequency Users | 8.00 | 7.00 |
| Mixed High-Frequency Users | 6.75 | 5.60 |
| Mixed Low-Frequency Users | 5.24 | 6.85 |
| For Total Sample | 8.65 | 7.79 |

**Writing Differences between Letters and Electronic Schools Bulletin Board Entries.**

Did the revision students made for the Electronic Schools Bulletin Board make a difference in terms of complexity and elaboration of the writing? Just how much revision took place was difficult to determine from the final product. However, students knew the Electronic School Bulletin Board was read by everyone in the Project and teachers were also aware of this fact. Illustration of some of the differences between the writing for letters and for the Electronic Schools Bulletin Board were provided by two deaf students. As with other examples in this section, these are retyped with punctuation and format added.

In the first pair (Letter and Bulletin Board entry), the letter was to an adult and it had a very practical purpose. The student centered on his problem and asked for clarification. In his Bulletin Board entry he described the coming of Spring and some of the things he might do. He used a parallel construction, "I could, .... but, ....."

**(103 A Letter to an Adult)**

XXXxxx.
This is Xxxxxx. How are things?
I would like to know how can we send back the other cartridge we had for this terminal. Now I am using editing buffer cartridge to do this letter. See you around.

**(103 B Entry to Electronic Schools Bulletin Board)**

Finally we get a break in the weather. On Saturday the weather was great. I could have gone swimming but the water was too cold. I could have gone biking, but my bike has no brakes which meant if I went downhill I would not been able to stop. I could have gone hiking, but the field was getting wet from the melting of the snow. Even if I did go hiking my feet would be soaking wet from walking through the slushy field. So, on this particular Saturday, I enjoyed the sun and the warmth of the weather. I was glad that Winter is over and Spring is here.

In the second pair, the student wrote to a peer. The first part of his letter explained who he was and what some of the things were that he liked. He went on to ask about the school life of his correspondent and then told more about himself and his hopes for the future. In the Electronic Schools Bulletin Board entry, he

shared his excitement of winning the contest and how the rest of the class reacted to the news.

**(407 A Letter to a Peer)**

Hello.
This is Xxxx. How are you doing? I am fine. I am 15 and I will be in lOth grade next year. My hobbies are playing sports and listening to music. I know Whitney Houston and Janet Jackson all right. I like both of their albums. I like Janet's songs When I Think of You and Nasty. From Whitney's songs. I like How Will I Know. But, you should know that my favorite musician is Robert Palmer. I like his song Addicted to Love. As for my favorite TV show, I like the Cosby Show and Who's the Boss.
Do you like school? I do because it gives me a good opportunity to get a good job in the future. I have good grades and I hope this is a good factor in the future for me. I do not like homework even though I like school. If you ask me my profession, it is writing for you answer. I am majorly interested in becoming a full fledged author. I have been an Editor-in-Chief for the school newspaper and I suppose that is another factor to a good job in the future for me. You could say journalism for that.
Well it has been nice writing to you. Write back. And bye, your friend, Xxxx.

**(407 B. Entry to Electronic Schools Bulletin Board)**

One day during telemail class there was a wild panic. Xxxx Xxxxx and I had sent in stories about our favorite TV show. We did not expect to win, but we felt we would be good competitors. Days had gone by without much notice. Then, one day when I was checking my private mail on telemail I noticed a queer letter about the TV show contest. I typed a few letters and then read the deciding message. All of a sudden I interrupted the peaceful silence with a yelp. Xxxx came running to the computer along with everyone else and together we read the details about the winning stories. Xxxx and I had won. The rest of the class along with Mr. Xxxx were dumbfounded. Xxxx was shocked and impressed with his story. I just smiled with pleasure. A few weeks later Mr. Xxxxx held a package in his hands and said I received some T-shirts for Miss Xxxxx and I. We all laughed because we knew the shirts were for Xxxxx and me. I glanced at the shirts and knew the shirts was not the right size. I had asked for a medium size, but then I knew 1 should have asked for a smaller size. Xxxx's shirt fitted him fine. I thought this was an exciting experience of winning a contest. Xxx thought so too.

We compared the T-Unit means for those students who wrote to both types, the letters and Electronic Schools Bulletin Board. These group means indicated that, in each case, the average for the school's writing was higher. Apparently, classroom revision strategies did make a difference. These group means are given on the following page.

**Table 40**
Student Writing to Peers, Mature Writers, and for the Electronic Schools Bulletin Board (Mean T-Units for Each Type)

| Student Group | Mean T-Unit for Letters to: Mature Adult | Peers | Bulletin Board |
|---|---|---|---|
| Deaf High-Frequency Users | 7.07 | 7.72 | 8.50 |
| Deaf Low-Frequency Users | 6.15 | 4.91 | 6.78 |
| Mixed High-Frequency Users | 5.39 | 4.58 | 5.38 |
| Mixed Low-Frequency Users | 4.44 | 3.63 | 6.27 |

**Table 41**
Effects of Revision for Electronic Schools Bulletin Board Comparison of Mean T-Unit Scores for All Letters and Electronic Bulletin Board for Students Writing to Both Types at Year II.

| Group | Mean T-Unit Letters | Electronic Schools Bulletin Board |
|---|---|---|
| Deaf High-Frequency Users | 7.13 | 8.50 |
| Deaf Low-Frequency Users | 6.17 | 6.78 |
| Mixed High-Frequency Users | 5.09 | 5.38 |
| Mixed Low-Frequency Users | 4.58 | 6.27 |

## Conclusions

Questions regarding the effects of writing to a mature writer and the differences shown by students when writing to different audiences or for revised writing destined for the Electronic Schools Bulletin Board were answered descriptively. Among other characteristics, we saw these changes were accompanied by increasingly more organized writing and a movement which paralleled Britton's theoretical perspective of writing development: from the expressive mode outward toward both the functional, or more practical writing, toward poetic forms.

The data of students who wrote three or more turns with a mature writer and those who wrote for both the Mailbox and the Electronic Schools Bulletin Board were separated from the total writing sample for a comparison of T-Unit scores in each category of writing. These figures indicated a positive increase in fluency and elaboration when students were involved in an on-going correspondence with a mature writer. Further, in terms of providing motivation, or greater purpose, for writing, as well as a model for clarification, the writing with mature writers influenced students. Students saw the need to be more specific in their responses when they realized their messages were not understood as they wished them to be.

In conclusion, we learned much from the students who wrote letters and Electronic Schools Bulletin Board entries in the Project. Results for our two major questions were clear. Students did make progress in their ability to communicate with others. Their writing did change in a positive direction in fluency, organization, and specificity as measured by holistic scoring. As seen in terms of mean T-Unit scores, their writing did change in both complexity and elaboration.

# Analysis of Results - Year 3

The changes students made in writing over the three years is the concern of this part of the report. Competencies selected for analysis were defined as those enabling students to write with increased fluency, organization, specificity, complexity and elaboration. To examine these outcomes, the writing samples of students were examined using the primary techniques of Holistic Scoring and Mean Number of Words per T-Unit and secondary analyses of Features and Functions.

Types of writing selected for analysis were kept as uniform as possible. The writings for the Holistic pre- and post- samples were descriptive. The writings for the Electronic Bulletin Board were all designed for public distribution; letters were personal and private. Audiences for the letters varied from peers to adult members of the Project staff. The two-year analysis separated the writings for these two audiences, the third year did not because questions of differences between peers and adult letters had been explored in the report at the end of Year II.

## Results

As indicated in the analysis at the end of Year II, the procedures which showed the most promise in measuring change were Holistic Scoring and Mean Number of Words per T-Unit. Those data will be reported first in this section followed by the data related to the frequency and variety of Functions and Features.

*Holistic Scoring for Year I-II and Years I-III.* Scores of students in the recategorized groupings of Year I-II indicated that 87.5% of the students in the High-Frequency group increased their scores; 50% of those in the Low-Frequency increased their scores. This data is shown in Table 42.

Regardless of frequency use, a majority of all 15 students, 73.3%, in the third year group increased their scores. Thus, the general trend of scores remained similar to those at the end of the two-year period. The range of scores at Year I was a low of 2 to a high of 4 with a median at 2.5; at Year II, the low score was 2.5 to a high of 6 with a median at 3.5; at Year III, the low score was 2 to a high at 6 with a median at 4. This is shown in Graph 4.

*Mean Number of Words per T-Unit for Year I-II and Year I-III.* Scores of students in the recategorized groupings for Year I to Year II indicated that 87.5% of the students in the High Frequency user group increased their scores while only 40% of the Low

Frequency user students showed an increase in scores. This data is shown in Table 43.

For the total three year group of students, Mean Number of Words per T-Unit scores showed 73% had increased scores Year III over Year I. This percentage data is shown in Table 44. Range of scores for these students showed a progression in a positive direction: Year I, a low of 3.36 to a high at 10.87 with a median at 4.64; at Year II, a low of 4.09 to a high at 10.56 with the median at 6.27; at Year III, a low of 4.54 to a high of 10.34 with the median at 8.22.

*Number and variety of Functions.* The results of coding the list of Functions found in student writings was reported at the end of two years and can be found in this report. Frequency coding of Functions during the third year showed similar trends. Students most often used language to: report and describe personal or general facts, provide social markers, request personal information or opinion, direct and suggest, explain and justify, indicate wishes and hopes, or apologize. Less frequently used Functions were to: request clarification, report opinions, and request general information. Virtually no use was made of complaining or requesting academic information.

*Number and frequency of Features.* The most frequently used Features in student text for both Years I-II and Years I-III were the same as reported at the end of Year II and are shown in that report. Frequently used Features were those of time and location; less frequently used Features were those related to contrasting ideas. Less frequently used Features correspond to those coded Number 3 through 7, the constructions signifying classification, cause-effect, comparatives, negatives, or comparative-superlative forms.

Indications of the variety of the seven types of Features exhibited in the writings of the students for all three years showed students used at: Year I a low of 2 types to a high of 7 types with a median of 6 types; Year II a low of 3 types to a high of 7 types with a median at 5 types; Year III a low of 3 types to a high of 7 types with a median at 6 types.

## Discussion

The two year data provided the best picture of differences between the frequency groups. Those student who wrote more frequently either maintained a high level on measures taken or improved their scores. In both the Holistic Scoring and Mean

Number of Words per T-Unit approximately 90% of these High Frequency users wrote with greater fluency, specificity, organization, elaboration, and complexity. Only about half of the Low Frequency students did so. While some of the gains could be attributed to maturity over the two-year time span, much of the outcome effects was seen as the result of student attention to writing for a purpose to a chosen audience.

Individual score data for the primary measure of Holistic Scoring and Mean Number of Words per T-Unit for each of the three years showed that students who scored lower at the start of the Project had the largest gains; students with higher scores at the start maintained or increased their scores, but the magnitude of the gains was not as great. Median scores for the same three-year period indicated more progressive change than was present at the upper and lower range points. Interpretation of these results lead to a belief that individuals who scored at the median levels had potential for greater gain and were encouraged by the use of the system. Those at the upper levels of scores at the start likely had acquired writing skills and a certain level of competency. They already understood more about using writing to exchange meanings with others.

Analysis of the frequency and variety of Functions showed that students' tendencies were to use Functions related to the self rather than others and to write text related to present and past time frames. This aspect of Function may deserve further study because such a pathway parallels development of general language acquisition.

The variety pattern of students' usage of the seven Features indicated that reference to time and location predominated. These two Features were coded numbers one and two respectively. The remaining Features, three through seven, exemplified comparison and contrast and were considered indicators of higher-level cognitive process use. Analysis for all three years showed that individuals did not have much variation in the use of these upper-level constructions relates to basic cognitive abilities less variable over time.

There were several difficulties bearing on the analysis of the writings which clouded results. The first related to sample sizes, the second to the amount of writing Low Frequency users accomplished on the system, and the third to the amount of variability of measures. In an effort to keep all analysis of results on a unitary basis, a decision was made to use these same group-

ings for the writing analysis. This created a problem as this small a group precluded the use of a *Chi Square* analysis for the two-year comparison of High and Low Frequency groups because of zero scores in some cells. This also inhibited contrasting High and Low Frequency user groups in the third year because there were only three students in the Low group and two of these students did not use the system during the third year. The result was that in the writing analysis Low and High Frequency group scores were not particularly valid for the Year I-II and impossible to gauge for Year I-III.

A second analysis problem related to the number of entries made by individuals in Low Frequency groups. The cumulative number of entries for the two-year Low Frequency users was ten or fewer uses over a two-year period; this reduced the accuracy of any judgment about these students' abilities. The results for this group should be read with caution because this low number of writings may not have been a true sample of these individuals' abilities.

A third analysis difficulty related to measure variability. This was a particular problem for the small numbered Low Frequency user group data; however, it also was true for the Mid and High Frequency user groups. The Mean Number of Words per T-Unit was affected by the additional variables of time given to the writing process and terminal use and aspects of personality and emotion. Leaving topic and audience choices to the student, a major procedural decision for the Project based on the hypotheses that such choice would motivate students, may further have clouded results. Emotional involvement and writing to an adult most likely influenced score levels within the same individual's writing.

Two examples from the same student written the same month in the third year showed this involvement or lack of involvement on the part of a student. (In these, and other examples which follow, all punctuation and format were added to the original text to make reading less tedious).

> (1) Hi Debbie. I am fine. I have been in school. Next week we are going on a trip. We are going bowling. I am happy about it. I like to bowl. I think I am going to win. Do you like to bowl? Bye. (Student 1104).

> (2) I would like to meet Janet Jackson. I have all of her records and I like the way she sings. I would like to go to one of her concerts and meet her backstage after it was over. I would like to shake her hand and we would talk. I'd ask her about her family and some of her albums. I'd tell her that I like the way she sings. It would be very exciting.

When I went to see her, I'd wear a red dress with a blue bow. She would be wearing a black suit. Of course she would look great. If I was to meet her, I would be suprised because I never thought I'd ever meet anyone famous especially not Janet Jackson. (Student 1104)

In (1) the student wrote mainly from a sense of making contact with a correspondent and has little to say other than to chronicle events. In the second example (2), she expressed her feelings and elaborated by using more complex constructions, "If I was to meet her, I would be suprised because I never thought I'd ever meet anyone famous especially not Janet Jackson."

This student was in the three-year Mid Frequency user group and had other entries similar to Number (1). The range of her Mean Number of Words per T-Unit scores went from the 4.0, Number (1), to 9.62 and her median score was near 5.50. Both higher-level scores were Electronic Bulletin Board entries which presumably were edited and in which she had particular topical interest.

As in the years I-III, in Year III, there were still differences between letters to an adult and those to peers. The following letters, (1) to a peer and (2) to an adult illustrated some of these differences.

(1) My name is XXXX XXXX. I am eighteen years old. I go to school at XXXXX. I live in XXXXx, XXXXXxx. I have a little brother. We play together a lot. I like to go to school. I like to work there. I learn about money, math and reading. I like to sing songs. When I am at home I like to watch TV. I watch cartoon. Sometimes I play. How are you? Do you watch TV? Do you like work? bye. Write back soon. (Student 1107).

(2) Hi Debby. Sorry I haven't written, but I have been busy. I like the workshop. I have a good time there. I like it there.

I haven't written because I have been going to tennis every week. My class goes every Tuesday. We like to play tennis. We play inside. We take a bus to get there.

Yesterday, we went to see wrestling in the city. It was fun. I sat in front and was able to see everything. There were a lot of people there. I hope I can go again sometime.

Bye, your friend,
(Student 1107).

Both of these entries contained many simple syntax constructions of subject-verb-object. Both provided explanation: (1) "I learn about money, math and reading." but in (2) she used a dif-

ferent syntax form, "Sorry I haven't written, but I have been busy." and "I haven't written because I have been going to tennis every week." In (2) she elaborated by telling when and where she plays tennis land how she traveled to the tennis class.

Letter (2) also illustrated the process of "chaining" which many students used. In this letter, the student explained, "we take a bus to get there." This brought to the student's mind the topic of "bus" which is a trigger for the next paragraph dealing with a bus trip in a diferent context.

Students also showed more involvement when they talked about conditions surrounding their handicaps. Two examples from the same student told about the arrangements made for the student in his grandparents' home and the attitude he held toward his disability.

(1) Hi. I was rolling in the gym. I like to go to gym because I like the people in gym. they are xxx, xxx, and xxx. We play and work in the gym. Sometimes xxxxx and xxx come into the classroom for gym, but we can't do as much because there is no space. The day you came to the gym I was practicing my rolling.

About the potato salad. I can get you the recipe. My nanny told my brother how to make. I hope that he didn't forget, but if he did I can call my nanny. She is home now. When I get it I will send it to you in the mail, either this mail or the public mail. My grandmother's potato salad tastes great. I can't stop writing about it.

When I am up at Maine, I go swimming after lunch, but last year I didn't go swimming because I didn't want to. This year, before my grandparents came home, they put in a cement walkway so that I can get around easier when I am there. They also took the stairs out to the lake and made it a ramp. They had to take a tree stump out because it was in the way. They also make a path to the front of the house so that I can get in the house easier.

Bye.

Please write back soon.

(Student 1108).

(2) If I could have just one wish, it would be able to walk. I want to walk and get out of this wheelchair. I have never gotten out of this chair without someone to help me. I want to be normal like anyone else, but a little help would be appreciated in accomplishing this. That is why I made this wish.

You see, I have the willpower to walk, but that's not enough. I know that without this wish, I would not be able to walk. Yet, I also know that this wish cannot possible come true because this is just a contest. But, it doesn't hurt to wish.

(Student 1108).

This student's letter (1) was general about the gym work and changed in clause length as he became more involved in ideas close to his central being, when he began to talk about his grandparents' efforts to accommodate him at the lake. The second entry (2) was likely edited for the Electronic Bulletin Board; it was written in response to the contest on the wishes topic.

Another student wrote on the Electronic Bulletin Board about her joy at being selected as a mainstream student and responded to a correspondent about the same topic.

(1) Mainstreaming in XXXXX High School

Hi everyone. My name is XXXX XXXXXX. I'm a senior at XXXXXX in XXXX,XX. I never had biology class because I skipped tenth grade and all sophomores were supposed to have biology. So, I had chemistry in eleventh grade. This year XXX picked me as a mainstreaming student at XXXX High School for an experiment. XXXX (school) wants to see if I'm successful there. Of course I was so excited and also glad to take biology at last. So far, I'm doing great in Regents' biology which is the most advanced course at XXXXX. It is a college prep course. I'm a "B" student. I'm very happy with my grades. My classmates are so nice. They are twenty-two students including me in biology. They are learning a few simple words in sign language. So, I'm going to make year a successful one for both me and XXXXXX (my school).

(2) Debby. Hi. It's great to be back on the Telemail.

I am sorry that I didn't write you back. It was because of the two weeks of the tests. I am glad it's over. I thought I was about to drown into tests, but my brain saved me. Ha. Ha.

You asked me about Regents' biology. I still love it, but not this time cause it is about plants. Ugh. It's boring, but after vacation we talk about sexual and asexual reproduction. I can't wait cause it is very interesting subject. So far I didn't fail once. Yaaah. This Friday I will take a test on plants. I wish it's over, but it's not. The time seems to be so slower for me. Oh well, talk to ya later. I gotta go, now. Bye, bye.

(Student 506).

In the first (1) of these two examples, the student expressed her pleasure at being selected to represent her school in mainstreaming and she told about on the ways she shared her competency in sign language with new classmates. The second (2) was a letter to an adult in which she responded to the topic of the first example. This student was in the High Frequency user group the second and third years and in both entries she used more complex syntactical constructions. The Board entry was at a higher Mean Number of Words per T-Unit level, perhaps as an effect of revision.

The findings on improvement of writing abilities of the students in the recategorized two-year and in the three-year group were related to the freedom students had to write or not to write and the choice they could make about audience and topic. Because the Project ascribed to the belief that topic selection was related to desire to write, a decision was made not to take rigorous control of subjects about which students wrote. This was completely true for letters and the only Electronic Bulletin Board assignments made were for an initial introduction of the student to the participants of the system (the Pre-test for Holistic Scoring); a writing about an event that happened at home or school (Post-test for Holistic Scoring, Year II); and, the contest topics suggested at Year III (Holistic Scoring, Year III).

There were, then, a series of choices a student had to make. The first choice students had was whether to use time to write on the terminal beyond that arranged by the teacher. Another choice related to the audience the student selected and the form which the writing might take in a letter or as an Electronic Bulletin Board Entry. Other choices were required as the topic was selected and the student made a decision whether or not to revise the text. It is difficult to judge, but the number of choices required of the students in this process may have had differing effects on raising or lowering motivation, and their decisions affected the involvement they had in the writing.

Other external factors influenced students' motivation and affected the frequency with which they wrote. The "idea" of the Project and the hardware supplied an initial stimulation tempered by any difficulties students had in learning to use the terminal or mechanical problems which arose. Further motivation was supplied by teach stimulation through pre-writing activities and by external forces, such as the contests. The idea of contests first came from a student in the second year and effects

on writing were minimal; the third year contests had a more striking effect. Contest participation helped students see a need for revision of their Electronic Bulletin Board entries. They showed increased involvement in their writing for the Electronic Bulletin Board; and, as the student did in the letter below, for thank you letters they wrote in response to earning a prize.

> Dear Debby. I wanted to say something to you before you say... I really wanted to tell you thank you very much that you send me a T-shirt. That day after my teacher came to see me in my class with XXXX and XXXX, too, and we got a surprise that I got the T- shirt from NYU. And I wore that shirt and it look nice on me. And everyone said, "How gets that shirt?" I told the people about it. So that I wanted to say think you very much Debby. I hope that I will get other contest again.
>
> I have to go because I have to let Katie to it this before she go to hearing biology. That's all, Friend.
>
> (Student 507).

Perhaps the initial reaction of two of the three Holistic Scoring readers after reading the first-year pre-sample and the post-sample of papers in the third year best summarizes the effect of the Project on student writing. These two experienced readers simultaneously asked the third reader if these were the same students whose text they remembered reading in the pre- post-samples at Year II. They expressed amazement at the improvement they intuitively sensed in the papers of the third year; and, in fact, the scores they assigned these papers showed growth in individual students through the course of the three years of Project participation.

In general, the analysis results indicated that students benefited from access to the electronic system, particularly when it was used more frequently to write for purpose to real private or public audiences. The conclusion was that students acquired writing strategies through classroom attention to prewriting events, encouragement of teachers, and the motivation to use the electronic system.

**Table 42**
Year I to Year II: Pre-post Holistic Ratings: Percentage of Change

| | High Frequency Users N = 8 | Low Frequency Users N = 10 |
|---|---|---|
| % Scores Increased: | 87.5 | 50.0 |

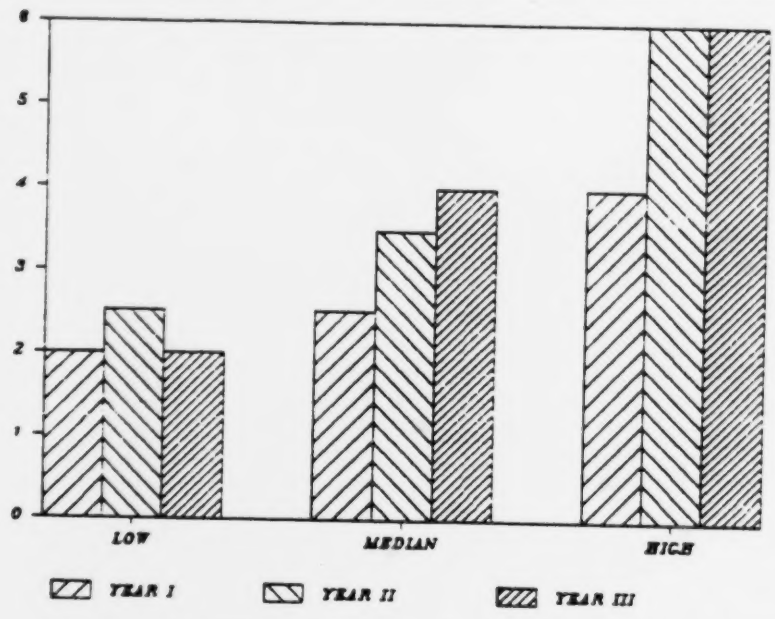
**Table 43**
Year I to Year II: Mean Number of Words per T-Unit Scores: Percentage of Change

| | High Frequency Users N = 8 | Low Frequency Users N = 10 |
|---|---|---|
| % of Scores Increased: | 87.5 | 40.0 |

**Table 44**
Year I to Year III: Mean Number of Words per T-Unit Scores: Percentage of Change

| | High Frequency Users N = 6 | All Users N = 15 |
|---|---|---|
| % of Scores Increased: | 83.3 | 73.0 |

**Graph 4**
Holistic Scoring
Range Of Scores, Year I, II, III



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August 8, 1988

Dr. Doris Naiman
School of Education
New York University
New York, New York 10003

Dear Dr. Naiman:

I have read the final report of your project and am very impressed with the results. Having attended the meeting where you and your staff summarized results for professionals interested in your project, I was able to observe first hand the enthusiasm of the students and teachers who participated in the program. In addition to becoming more proficient in the substantive and procedural aspects of their communication, their social growth was noteworthy as was their ability to master and then capitalize on the communication equipment.

For what it is worth, I recommend strongly that the momentum you have gained in the course of the project be absorbed by a national organization such as the National Association for the Deaf toward the end that a national bulletin board and system of electronic mail drops be put in place. This would would then make possible access by students and teachers in public and state school programs for deaf students. The National Technical Schools may want to play a key role in such an endeavor.

In any case, you have devised and demonstrated a remarkable use for what could be an effective procedure in the academic and social growth of youngster with severe auditory deficits. You and your able staff are to be congratulated.

Sincerely,

Herbert Goldstein
Professor Emeritus

# Project Experiences with Special Disabilities

The following section has been designed to provide information regarding the utilization of telecommunications as a means of improving literacy skills by teachers who are working with a wide range of special education populations. Although traditionally students in special education have been grouped into categories such as mentally retarded, learning disabled, emotionally disturbed, hearing impaired and physically disabled, the intent of the Project has not been to demonstrate how any one group uses telecommunications; rather, the aim has been to explore the noncategorical utilization of telecommunications in improving literacy skills. However, for clarification purposes, this section has been organized into four subdivisions which refer to Project-related experiences with: 1) Students with Psycho-Social Behavioral Problems; 2) Students with Cerebral Palsy; 3) Mentally Retarded Students; and 4) Deaf Students.

The primary goals of the Telecommunications Project have been to provide educators with an innovative approach to instruction along with providing special education students with a motivating new method of acquiring literacy skills. These goals have taken on a special significance when viewed in relation to the current educational philosophy of providing each and every child, regardless of type and degree of disability, with the opportunity to learn. This philosophy has been embodied in Public Law 94-142—The Education for All Handicapped Children Act (also known as The Mainstreaming Law) which was passed in 1975. Therefore, this recognition of the right of *ALL* disabled children to have access to an appropriate education (education being defined as any endeavor involving the attainment of cognitive, affective, and/or behavioral responses that leads to new and/or improved skills) has required educational systems to develop an innovative approach to instruction in order to meet the unique

and individual needs of its special students. The Project has been just such an approach.

The Project's field testing of telecommunications as a means of instruction to teach literacy skills has resulted in three major findings: first, that students who present significant physical, social, cognitive and/or psychological problems are able to use telecommunications as a means to learn literacy skills; second, that teachers who work with special education students are creative and innovative in their utilization of telecommunications as an instructional process; and finally, that the utilization of telecommunications as an instructional procedure has not only enhanced the students' literacy skills but also has had a positive effect on their affective, social and psychological behavior.

The information in this section has been based on the teachers' use of telecommunications with their special education students. The teachers' experiences and the performance of their students in relation to the Project should be viewed as illustrations and documentation that telecommunications can be an effective and viable instructional process.

## Students With Psycho-Social Behavioral Problems

Our participants have included students who exhibited patterns of maladaptive behavior severe enough to interfere with their ability to function and learn. The behavior of the students ranged from extreme lack of control, hyperactivity and almost complete unresponsiveness and withdrawal from interaction to milder forms of behavior including shyness and insecurity. The Project has had special possibilities to offer these students.

They have had an opportunity to engage in non-threatening activities that enhanced interpersonal relations and self-confidence. The Project has offered a nonverbal, nonconfrontational way for students to achieve success in learning to express themselves by communication through writing and reading. By using computer telecommunication technology, students have begun to explore areas that were usually disturbing to them.

### Improving Interpersonal Relations

The Project has been successful in working with students who initially were withdrawn and holding back from interaction with others. By communications via the terminal, the students were able to begin to establish relationships without direct confrontation with other individuals. The terminal supplied the inter-

mediary step between a computer with no human contact and a live dialogue with direct contact. Students have exchanged thoughts and feelings at a comfortable pace while at the same time gaining practice in communicating and have experienced a gradual decrease in fear of closeness.

A 16-year old student had been extremely fearful of being close to anyone. He had a troubling home life and no friends at school. After several attempts, his teacher finally encouraged him to use the terminal. The Project Director had written him a letter which at first he did not read. A week later he decided to take the letter off of the terminal and left it, unread, in his desk "for later." After a few days, he asked his teacher for assistance in reading the letter. The next day he asked to get on the terminal to compose a letter in response to the one he had received. In addition, he decided to write to a girl whose "name he liked" at another participating school. This time he read his letters more quickly and was less agitated by their arrival. The teacher said she felt that the anonymity of his correspondents made initial contact less threatening and helped establish interpersonal relations. The teacher at the school reported that a decrease in physical outbursts at school seemed to be related to the student's satisfaction in his correspondence.

The Project also has helped students having difficulty making friends. As part of one student's correspondence, he created something tangible, the typed product of his Telenet messages which he could share with others in his class. He took his messages and showed them to another student in his class. The two students began a friendship based intially on the exchanges via the terminal. The student's correspondence had provided him and his new friend with a forum in which a new friendship could develop. This type of sharing has allowed shy students unable to initate interaction on their own to develop ways of being with others.

---

**Increased Self-Confidence**

Another way in which students' psycho-social behavior has appeared to benefit has been in the development of increased self-confidence. Three special aspects of the Project which assisted students in feeling more self-confident have been: mastering the equipment, going public and assisting others.

### Sense of Mastery

The fact that students in the Project were learning to operate new, sophisticated technology contributed to their feeling of being a participant in the "twentieth century." With this experience, students began to develop a sense of mastery over the equipment which later generalized to other areas.

An important effect of students' mastering the equipment has been the confidence gained that enabled them to attempt to learn other types of computer technology. A young girl at one of the schools in the Project was afraid for a long time of using the new computers in her classroom. When approached by her teacher she demonstrated clearly that she did not want to "get on." She did, however, like using the Project terminal since it gave her a chance to communicate with other students. Over time she grew more capable on the terminal and eventually mastered its use.

### The Effect of Going Public

For the emotionally reserved child, there also has been a reported increase in self-confidence. A shy boy at a participating school was afraid to expose himself and his work to others. He would put on the Bulletin Board only stories that he had copied out of books. After doing so several times and having gotten supportive feedback on his efforts, he developed enough courage to risk placing an original story on the Bulletin Board for the public to read.

A shy student at the same school had trouble engaging in minimal conversation with others. He also was fearful of communicating with other students through the Private Mailboxes, but was encouraged to write a public, anonymous piece to the Bulletin Board. His school was preparing for the upcoming Martin Luther King, Jr. holiday and he had written a piece on Dr. King to commemorate the day. His imagination had been fired and he mustered enough confidence to put the piece on the Bulletin Board. As a result of the confidence gained from this experience, he felt safe enough to give an oral presentation of his work at the school's assembly. The festivities were recorded on video tape and the Project director happened to visit the class on the day that the tape was being shown. The student sat with visible pleasure, confidence and pride as he and his classmates viewed his presentation. He has been able to continue this success by writing pieces to the Bulletin Board about his dreams and his father in Barbados.

### Assisting Others

A third area where growth in self-confidence has been observed has been in students with histories of needing repeated assistance from others. Through writings on the terminal, students have been able to offer assistance to others seeking advice on various matters and, as a result, have derived feelings of increased self- esteeem. A teacher reported that one of his students felt especially good at being able to do exactly this.

In an attempt to motivate the students to take an interest in assisting others, one of the Project staff had written a letter to the Bulletin Board seeking advice on what her son might do to prevent a bully in his class from continually harrasssing him. The student responded immediately with useful advice on how the child might protect himself from the bully and strategies he might employ to prevent further difficulties. He went on to say, "You should tell your son to go to karate school and learn to defend himself and show him (the bully) that he is not afraid him". It has been particularly meaningful for this student to be able to assist others since it had been his experience only to receive help rather than being able to offer it. He clearly had enjoyed the opportunity to reverse this pattern and it has provided him with feelings of self-worth and satisfaction.

### Changing Maladaptive Behavior

One of the students at a school for the mentally retarded has enjoyed the opportunity to read his messages out loud to the class. Although he often had been aggressive, reading his correspondences aloud allowed him to interact with classmates in a participatory fashion rather than a hostile fashion.

One boy at a school for emotionally disturbed students, had liked only to hear himself speak. By using the terminal he has been able to recognize that communication occurs between two or more individuals and that there is a mutual sharing process that occurs. He has learned to ask questions and await responses, rather than simply rambling on at length. He has begun to learn to hear others. This phenomenon has been found at all levels. A teacher at the school for the severely retarded reported similarly that initially her students rarely exchanged basic questions, such as "How are you?" She reported that along with participating in the correspondence process via Telemail, her students have begun to exchange responsive greetings with one another in the mornings.

A boy at a school for deaf students wrote about his feelings of being put in a class of "bright students with attitude problems." He shared his experience of having been put on detention and what he thought he had learned from this. He said that he had been very shaken up by the experience but was very "lucky that principal just remove my detention last year, I am glad that I have no detention record. Thank to God." This admission was in stark contrast to the attitude with which he began his correspondence. Initially he had bragged about being put on detention saying it was "not a big deal," and only later in his writings began to express an awareness of how he felt.

### Special Suggestions for Shy Students

The Project has been effective with students, who though not actually withdrawn, were timid in getting started in relationships. For shy students it has been useful to have another student or an adult write to them first. It has been important to be sure that the student had a prompt response to any message. When given the proper stimulus, some students have abandoned their shyness in order to assist those in need (as in the example of the student who gave advice on the bully).

The whole idea of the Project has been to have students express themselves and feel confident and comfortable in doing so – or at least start learning to do so. The Project has been especially good for students with psycho-social difficulty.

## Students With Cerebral Palsy

Students with cerebral palsy have taken to the Project with a unique enthusiasm and determination. This eagerness has been reflected in the extraordinary amount of use the students have made of the terminal and the clear pleasure they have derived from their new pen pals. In addition to the benefits offered to all students by the Project, students with cerebral palsy have discovered others.

The students in the Project experienced varying degrees of cerebral palsy from mild to severe involvement. All of the students had limited gross motor abilities and consequently, were wheelchair bound. The fact that the students were in wheelchairs may have contributed to their heightened desire to be involved with the technology of the Project and the excitement that came with mastering its use.

The initial motivator for the students to become involved has been the attractiveness of having their own mailboxes in which they could receive and send letters to other students. Every student was quick to understand this fact and was delighted with it. Throughout the Project students have continued to express their pleasure at being involved with the technology.

## One-to-One Assistance

Because of the severity of the students' physical disabilities, the need for one-to-one individualized learning has been clear. A carefully structured plan has enabled this to happen and has been found to be feasible. The availability of an extra person, such as a teacher-aide who could work individually with each student outside of the classroom environment at least once a week, has been helpful and during one-to-one assistance each student has been able to gain practice at composing and sending messages.

## Mastery and Building Confidence

A sense of mastery has been particularly important to this population since physical achievement was normally so unattainable. However, mastery for these students took on a quite different meaning than for the other groups in the Project. For the other groups, mastery was related to the equipment. With these students, instead of mastering use of the equipment, they were mastering the procedures of the whole experience. They had a sense of the process and the product as being theirs.

The students have been in control of all aspects of the correspondence in which they were engaged. They have been responsible for telling the teacher the correct usage of the commands necessary to operate the terminal. The teacher's role has become gradually more passive as the students demonstrated their increasing ability to use the telecommunications unit independently either manually or through dictation. The students were able to use the teachers as tools through which they could produce their finished efforts and to experience the whole process as belonging to them.

This has been true even of students who exhibited severe athetoid and spastic quadraplegic cerebral palsy and were not able to use the terminal independently. These students also gained feelings of competence and achievement.

The students' sense of mastery has been related to increased feelings of confidence in themselves and their ability to succeed.

A teacher reported that at the beginning of the Project one of her students lacked the confidence to respond to even simple greetings. After a few months the student has become more confident in her responses. Whereas in the beginning it was "like pulling teeth to get a couple of words out of her," the teacher has reported that later on, she needed continually to remind the student to slow down because she "was talking more quickly than her (the teacher's) fingers could type!"

## Social Growth and Making Friends

The Project has been especially helpful in fostering positive changes in both social and emotional growth in the students with cerebral palsy. Students have made new friends with whom they were willing to share their everyday experiences. Initially, some students had been reluctant to write to individuals whom they did not know; however, after increased familiarity with the Project, the students have reached out to students from other schools. The topics in the letters have varied according to the students' cognitive abilities, grade levels, interests and personal experiences and many of the letters have pertained to school events and weekend activities. Some of the students have demonstrated a willingness to share openly about their home lives, as well as their feelings, opinions, likes and dislikes.

One student, through his interactions with a pen pal in Boston, learned that they were both involved this year in putting on similar plays based on the Beatles and their music. This student gained increased awareness of other disabilities since his pen pal in Boston was deaf. Having asked his pen pal to share his feelings about what it was like to be deaf, the student was then asked to share his feelings about what it was like to have cerebral palsy. The two students established a bond of friendship through their curiosity, honesty and desire to share with each other.

Another student, who had plans to move to Florida at the end of the school year, expressed his feelings about moving. He stated that he felt very nervous and sad to be leaving his classroom of which he had been a part for four years and ended his letter on a lighter note by recognizing the fact that at least, he would be able to watch all of the pretty girls in their bikinis.

A third student eagerly shared his love of nature with his pen pal by telling about one of his favorite television shows, "Nature." He enthusiastically relayed to his friend that the show had taught

him how to watch out for dangerous animals, how to camp safely and how to recognize endangered species.

Still another student readily shared his experience of visiting Washington D.C. and meeting Mrs. Nancy Reagan. He explained how Mrs. Reagan was doing a spot for the Cerebral Palsy Telethon and that he was picked to be interviewed by her. He stated that "we talked to each other and I liked it. My picture was in the paper. I was nervous when I met her. I talked about Star Wars—you know, the rocket placement."

### Sharing About Their Disabilities

In addition to sharing personal feelings and experiences related to a variety of topics, the students with cerebral palsy seemed especially open to sharing their thoughts and feelings about their disabilities.

One student stated "I have CP. This means that one part of my brain don't work, my feet don't work either..."

Another student shared her feelings about receiving a "special" birthday present, stating "Yesterday was my birthday. I am so happy! I got an electronic wheelchair. I had one when I was younger. I love it!"

A third student told why his brothers don't go to the same school that he does "because they don't have what I have. They don't have a disability."

Another student related that she was feeling good but that she could be better and went on to describe how her therapist made a brace for her ankle two weeks ago in order to keep her ankle from going in. She stated how she must wear it everyday and "it bothers me a little bit, but I can take it."

### Growth in Writing Via Special Adaptation of Procedures

The students with cerebral palsy have been unique in that they have improved in writing skills via dictation as differentiated from typing their letters directly on the terminal. Improvement has been noted in expressive language abilities during the course of the school year. Students who at the beginning of the year had a great deal of difficulty formulating thoughts and ideas into written language later became more comfortable and proficient.

One student initially had displayed the tendency to answer direct questions in only one and two word phrases. Later, after Project involvement, she attempted to write in sentences using

complete thoughts. Also, without prompting, she began to initiate new interactions with her pen pals.

Another student, who had continually demonstrated scatter in his organizational abilities, became more aware of this, and with assistance, began to develop a strategy with which to better organize his ideas.

The students with cerebral palsy have shown significantly increased interest and pleasure in reading. They have especially loved reading letters and stories written by their peers. More than any other group, they have shown positive changes in attitude toward reading.

## Mentally Retarded Students

Mentally retarded students have had an unusual opportunity to use reading and writing in a meaningful way. The students in the Project have included a wide range of cognitive abilities. For the severely retarded students in the Project, it has not been possible in every situation to allow enough supervised time to meet the students' needs for assistance. Nonetheless, with guided teacher assistance strategies, even the most severely retarded students have been able to participate. Instead of abandoning academic literacy goals for mentally retarded students as is frequently done, the approach of the Project has helped teachers provide a way to work effectively towards these objectives.

### Live Interaction

Literacy has been considered as an IEP objective for the students and has been conceptualized as growing from communication in a live interactive setting.

After discussing with the student what he wanted to say, the teacher has helped the student write down his thoughts. Writing has not been seen as an end in itself, but as a part of the whole process of communication in the classroom in which talking, listening, reading and writing supported each other. The written part of language has been influenced by the oral. In this way the student's literacy, on a basic level, has begun to be tied to his conversation.

### Appeal of Technology

The students have found it exciting to use the terminal. The new technology has motivated the students to become involved with the exchange process. While learning to put their thoughts

in written language, the students have been learning at the same time to use technical equipment. This accomplishment has made them feel more like a part of the "modern" world. A teacher described one of her student's involvement: "...once he discovered that, with my assistance, he could handle the mechanical aspect of the terminal, he was anxious to get on every morning to see what there was for him".

An especially attractive aspect of the Project has been that students came out with a product, a computer printout of their messages. Families have reported that their children came home with the print-outs of their exchanges. This has been important because it has given students tangible evidence of their achievements which they could share with those outside of the classroom. The students have been proud of what they had accomplished even if they have not been not fully aware of the intricacies involved with the terminal. Clearly the students have been pleased with what they had learned and were doing.

### Assistance

Assistance has been found to be the most influential factor in the mentally retarded students' success in the Project. In order to give the students a chance to enjoy and benefit from the technolgy, it has been crucial that they be assisted with every phase of usage. This has been true from the students' introduction to the terminal through sending and retrieving messages on Telemail.

### Hands-On

Right from the start, we have found that students have been most receptive when they were introduced to telecommunications by a hands-on demonstration. Because the Project has involved non tangible abstract concepts, such as far away pen pals, it has been effective for teachers to give a brief explanation of the process and then move on immediately to allow the student to actually use the terminal. In this way, students have grasped a firmer understanding of the exchange process taking place by actual involvement in the procedures without first having to master the more abstract component.

### One-to-One Assistance

Teachers have found working individually with students more effective than working in groups. Because most of the students were not able to use the terminals independently, teachers have

found it helpful to serve as an intermediary between the students and the more complex aspects of Telenet. Teachers have served as a link for the students in the exchange process by finding appropriate messages to which the students could respond. One teacher scanned the entries on the electronic School's Bulletin Board and then decided which of the entries might be interesting to individual students. She described one of the students in her class, who, initially, was not interested in using the terminal. After reading the Bulletin Board one day, she excitedly told him of another student's entry about a love of his – baseball. She shared the message with the boy who then began talking about how much he too loved baseball. The teacher asked him if he would like to share his thoughts with others by putting them on the Bulletin Board, which he agreed to do. The teacher helped the boy compose a short note explaining why he loved baseball and assisted him as he joyfully typed it into the terminal.

### Dividing Necessary Tasks

An instructional adaptation that teachers found helpful has been dividing the necessary tasks for composition. It is unrealistic to expect mentally retarded students to read, write and type a response onto the terminal all in one sitting. Teachers have discovered that, by breaking up these tasks into discrete activities, objectives have become more attainable for the student and strategies more practical. Task analysis has allowed the teacher to spend more time on each individual activity and has provided more time for students to develop pre language skills. By breaking up the three activities required to respond to Telemail letters into different time periods, the students have begun to understand the process of correspondence.

Appropriate adaptations have been crucial in making participation meaningful and effective for mentally retarded students. With the adaptations, students have been able to make progress and literacy goals could then be considered as realistic IEP objectives.

## Deaf Students

By placing a strong emphasis on the development of meaningful written communication with others, the Project has been able to address the special language/communication needs of deaf children. This has been accomplished by involving the students in a give-and-take sharing process which has encouraged

the development of fuller language and deeper thinking. Deaf students may have a hearing loss ranging in severity from mild to profound, which, depending on the degree of loss, affects the student's ability to hear, understand and use spoken language effectively. Any degree of hearing loss has a negative effect on ability to develop effective language/communication skills and profoundly deaf students have a serious problem in developing both receptive and expressive language skills.

Hearing students develop language informally through listening and imitation. The later development of reading and writing skills is based on this earlier establishment of a good language foundation. In the deaf student, however, language acquisition involves a long, tedious and frustrating period of intensive training. Frequently, the language and communicative difficulties experienced by the deaf student pervade all other areas of his intellectual, social and psychological development and functioning.

The Project has enhanced the reading and writing abilities of deaf students primarily by focusing on writing to communicate meaning. This approach has represented a change from the traditional formal and structured way in which deaf children frequently have been taught literacy skills.

## Enhanced Cognitive, Social and Language Development

For the deaf student who often has been deprived of opportunities to develop meaningful language, participation in the Project has been a motivating, enriching and rewarding experience. It has enabled deaf students who often have limited experiences as a result of segregated and somewhat isolated home and school environments to benefit, both linguistically and socially, from communicating with others who come from differing educational and cultural backgrounds. In this way, the deaf students have been able to increase the breadth of their communication with others and to enhance cognitive and social as well as language development.

The role of the adult correspondent has had special meaning for deaf students. The adult has focused on responding to the content of the students' messages in a caring, personal and sharing manner. Given this atmosphere of acceptance, the students have been encouraged to express themselves more fully and creatively, without the fear or pressure of being graded, corrected or criticized.

Deaf students typically write in simple sentences, using limited vocabulary and sentence patterns. The Project has helped to expand their language and communication skills by encouraging use of fuller language. The students have been able to accomplish this by being involved in a continuing evolving process of back- and-forth sharing of ideas and questioning for more or clearer information. Fuller language also has been developed through the use of modeling when the student has written to the adult correspondent.

For example, one student, in response to a discussion on movies initiated by her Project pen pal, described a film she had recently viewed entitled "Mannequin." She wrote that she didn't exactly know how to explain what the movie was about but she stated, in creative, descriptive language, that "...I think it is about love, foolish things to do, getting stuck when doing things, having good times together and working." In another example, a student, in response to a written "conversation" about New Year's resolutions, diets, exercising and final exams commented resignedly that "...My New Year's resolutions, well I never make them anymore since that I never keep up my own promises." However, she later states, very insightfully, that "...Life is pitiful...but life can be pretty good when things are going good for you, though."

Due to communication difficulties, the deaf student often has trouble in expressing his real feelings and thoughts. As a consequence, his communications with others tends to be stilted and non-expressive. Deeper thinking, like fuller language, has grown as the deaf student has become involved in the back-and forth sharing process.

One student explained how she got angry and lost control at school. After her pen pal asked her for more information, she explained how she had a bad attitude and temper when another person yelled at her. She expressed a desire to change and exercise more self-control in the future but admitted that "...it is difficult to change." When her pen pal shared with her similar experiences of losing control she replied "...I know that some do have bad temper and lose control too – no one is perfect, right?...we hope that you and I will work out and change to way feel better to learn how control...".

Another student, via the Project's schools bulletin board, shared her feelings and experiences concerning the death of her mother one year ago. She revealed how she ran into her bedroom and "cried and cried" upon being told that her mother had passed

away. When one of the Project participants responded to her letter by telling her of similar feelings when her own mother died, the student replied empathetically "...I'm sorry about your mom too. I'm glad that you have a nice family and that's good."

# The Role of the Adult Correspondent

Corresponding with an interested, mature adult has been an effective component of the Project. The adult correspondent has served as both a friend and role model to the students in terms of meaningful written language and communication. To accomplish this she has used an approach which was an adaptation of the dialogue journal concept developed by Jana Staton (Staton, 1981). The technique involved informal written conversation between student and adult. The focus always has been on writing to communicate. The adult correspondent never has criticized or corrected the students' writings, but instead has responded in an interested, sensitive and accepting manner to the content of the student's writings. This has been done with the primary goal of eliciting meaningful written communication from the students. Because of the adults's accepting, noncritical manner, the students have been motivated to express their ideas, thoughts, opinions, and feelings more fully and without fear of criticism.

## A Caring Relationship

The relationship between the adult correspondent and each student with whom she corresponded has been a real, caring and personal one. She has brought to the relationship her own feelings and past experiences. She not only has been concerned with helping the students to improve their literacy skills but also has shown a true interest in them as individuals – she genuinely has cared about what they had to say and her written responses to them have reflected this attitude. As a result of this nurturing atmosphere, the students have felt comfortable and secure in expressing themselves more honestly and fully.

## Focus on Writing for Real, Meaningful Communication

One positive effect of the Project's strong emphasis on writing for real, meaningful communication has been the development of original and creative writing styles in many of the students – the basic nature of the Project has encouraged the students to feel comfortable, unrestricted and use language in a free, spontaneous and open manner that felt natural and right to them. For example, one student, after reading the adult correspondent's letter stating that she was thinking about buying a kitten for her children and asking for suggestions, responded with "...if you want a used cat, go to the pound and pick out a nice cat." The term "used cat" as a definition for a cat gotten at an animal shelter had

been used in a thoughtful, descriptive and creative manner by the student to get across his message in a meaningful way. If he had used the term "used cat" in some typical English classes or on a standard English achievement exam, he possibly would have been regarded as using inappropriate or incorrect English language.

## Fuller Language

A primary goal of the Project has been to encourage the development of fuller language and has involved the use of more descriptive and complex English usage. This has been accomplished, in part, through the students' involvement in a developing give-and-take communication process with the adult correspondent. The students have written to her and she, in turn, has responded by sharing, asking and modeling meaningful written communication. By being involved in this continuing process, the students, many of whom had written in basic, simple language before Project participation, have been able to develop complex and meaningful written communication.

For example, one student, in one of his earlier letters, responded to the adult writer's inquiry about his school with "...work very hard in school. Will write you more." Later on, however, after a continuing back-and-forth "dialogue" about his father who lived in Barbados (and whom he missed very much), he was able to tell, in fuller, more descriptive, and complex language, about a dream he had had. In response to the adult writer's comments, "...in your dream you talk about a wonderful man who talks nicely to other people and respects them—is this man in your dream supposed to be your father?", he replied expressively "...yes, I dream about my father a lot. I dream about Barbados and the wonderful life. We plays cricket, tennis in the warm sun. Do you dream?"

Another student, in one of her letters to the adult writer, simply stated that she "...got a new coat and jewelry, and a pocket book for Christmas". After the adult enthusiastically shared with the student her love for jewelry and described her own treasured collection, the student responded with "...I got a pair of earrings and a chain and bracelets for Christmas. I love jewelry and like them very much. They are gold—I don't like any plastic or silver. I only like gold and diamonds. I can't afford diamonds but I still like them a lot". In another letter, the same student told the adult that she didn't have a "boyfriend right now, but maybe soon". After interested inquiry from the adult asking about the kind of

boyfriend she would like to have in the future, the student replied that she would like a boyfriend "who buys me diamonds,gold and fur...". In the next letter, when the adult asked her to imagine how her boyfriend would look, she answered in descriptive language that she would "want a boyfriend who dresses nice, is clean and looks good".

## Communicating on a Deeper Level

An important aim of the Project has been to motivate students to comunicate on a deeper level. This has resulted in less superficial, more real and meaningful communication. In the beginning many of the students wrote only about ideas, feelings or experiences that touched the surface. However, after being involved in an ongoing, sharing and personal relationship the students have been able to "open up" to a greater extent and express themselves more deeply. The adult correspondent has made a special effort to initiate, develop and sustain a sincere, caring and trusting relationship with students —a relationship that had been conducive to the development of deeper thinking.

For example, one student has been in a class for deaf students which is situated in a regular "hearing" public high school, and has been mainstreamed with hearing students for most of her academic classes since fourth grade. Initially, when asked by her adult pen pal if she liked being mainstreamed with hearing students, she replied that she really enjoyed it and was happy that she had never gone to school for the deaf. However, when the adult writer shared with her a personal experience of teaching a lonely and frustrated mainstreamed deaf girl and asked the question "Have you ever felt this way?" the student responded with "...I have been very frustrated all my life and still am...I feel frustrate because I always feel left out in my family, like when there are conversations going on and I tried to read their lips, but I don't always understand about what they are talking about..."

## Sharing and Questioning Technique

To help encourage and develop fuller language and deeper thinking in the students' written communications, the adult writer has used two basic techniques in her correspondence with them: sharing and questioning. She has used them either seperately or in combination in order to elicit more meaningful language from these students.

Through the questioning technique, the adult asked the students specific questions about what they had written in order to encourage them to clarify, broaden or expand upon what they had previously said. This is shown in the example above where the student responded to the adult's question of whether the man in his dream was supposed to be his father, he answered affirmatively to the question and then went on to describe, in rich detail, his dream about "the wonderful life in Barbados".

The effectiveness of the questioning technique also is seen in the adult's inquiry as to whether she has ever felt lonely or frustrated as a deaf mainstreamed student in a "hearing" world.

Through the sharing technique, the adult correspondent shared personal experiences, feelings, thoughts and opinions with the students in order to elicit more meaningful interpersonal communication from them. This technique helped to establish and maintain with the student a personal, caring and more intimate relationship in which they could feel comfortable in expressing and sharing their own feelings and concerns.

### The Modeling Technique

A goal of the Project, although of less importance than the two preceding ones of developing fuller language and deeper thinking, has been to encourage students to use correct English grammar, spelling and punctuation. This has been accomplished in a subtle way through modeling by the adult correspondent. For example, if a student misspelled a word or used incorrect punctuation in his letter, the adult never openly corrected the errors but instead, used the same word or punctuation correctly in her next letter to the student. Her letter then served as a model which the student could utilize in his future correspondence.

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# Appendix 1

# Standardized Reading Test Scoring Notes

## Reading Comprehension Tests - Scoring Methods

**Percentiles and Normal Curve Equivalents:**

In order to make statistical analyses of changes in the Reading Comprehension Scores of those participants for whom such data was available, it was necessary to first derive a percentile score for the inidvidual subject for pre- and post-tests and then convert that score to a Normal Curve Equivalent. This must be done because percentile ranks do not represent equal units along the score scale while the NCE does. There is a direct, fixed relationship between percentile ranks and Normal Curve Equivalents.

**Test Levels:**

All students were given the same test and the same level of the test for both pre- and post-study results to insure consistency of results.

**Test Scoring:**

These tests are ordinarily scored on the basis of grade and term (season). However, this measures the student against a national norm for grade/term, while we were interested only in the change in the students work as measured by the test against the student's own previous performance on that test. All scoring for pre- and post-study testing was scored or rescored on the basis of the earliest grade/term for that test and level using the raw score.

**Scoring Procedures:**

Percentiles for conversion to Normal Curve Equivalents were derived from slightly differenet sources in some of the schools. Schools and source of the data are listed below by code.

School/StudentSource of Percentile DataTest Used
101-107 Scaled score supplied by school SAT
201-212 Raw score supplied by school SAT*
301-310 Reading tests not used by school SAT
401-413 Percentile score supplied by school SAT
501-512 Raw score supplied by school Stanford**
Diagnostic
601-613 Raw score supplied by school SAT
701-714 Scaled score supplied by school SAT
801-805 Scaled score supplied by school SAT
901-911 Raw score supplied by school SAT
1102-1109 Raw score supplied by school SAT

SAT Stanford Achievement Test, 7th Edition
*Special Edition for Use with Hearing Impaired Students
**Stanford Diagnostic Reading Test

# Appendix 2

# Literacy Attitude Questionnaire

## Writing Questions

**For each item, circle your answer** Name_____

| | | | | | |
|---|---|---|---|---|---|
| 1. I write letters to my family and friends. | Almost always | Often | Sometimes | Seldom | Almost never |
| 2. On my own I write stories, plays or poems. | Almost always | Often | Sometimes | Seldom | Almost never |
| 3. When I have free time, I prefer writing to being with friends. | Almost always | Often | Sometimes | Seldom | Almost never |
| 4. I like what I write. | Almost always | Often | Sometimes | Seldom | Almost never |
| 5. A student who writes well gets better grades in many subjects than someone who doesn't. | Almost always | Often | Sometimes | Seldom | Almost never |
| 6. I voluntarily keep notes for school courses. | Almost always | Often | Sometimes | Seldom | Almost never |
| 7. When I have free time, I prefer writing to sports, games or hobbies. | Almost always | Often | Sometimes | Seldom | Almost never |
| 8. I leave notes for my family or friends. | Almost always | Often | Sometimes | Seldom | Almost never |
| 9. When I have free time, I prefer writing to watching television. | Almost always | Often | Sometimes | Seldom | Almost never |
| 10. Good writers spend more time revising than poor writers. | Almost always | Often | Sometimes | Seldom | Almost never |
| 11. I prefer writing to reading. | Almost always | Often | Sometimes | Seldom | Almost never |
| 12. I like to show people what I write. | Almost always | Often | Sometimes | Seldom | Almost never |
| 13. I keep a journal or diary. | Almost always | Often | Sometimes | Seldom | Almost never |
| 14. Writing is an important way for me to express my feelings. | Almost always | Often | Sometimes | Seldom | Almost never |
| 15. In a typical week, how much time do you spend writing outside of school?_____ | | | | | |

# Reading Questions

**For each item, circle your answer** Name_____

| | | | | | |
|---|---|---|---|---|---|
| 1. On my own I read books. | Almost always | Often | Sometimes | Seldom | Almost never |
| 2. On my own I read other things like newspapers and magazines. | Almost always | Often | Sometimes | Seldom | Almost never |
| 3. When I have free time I prefer reading to being with friends. | Almost always | Often | Sometimes | Seldom | Almost never |
| 4. I like to read. | Almost always | Often | Sometimes | Seldom | Almost never |
| 5. When I have free time, I prefer reading to sports, games or hobbies. | Almost always | Often | Sometimes | Seldom | Almost never |
| 6. When I have free time, I prefer reading to watching television. | Almost always | Often | Sometimes | Seldom | Almost never |
| 7. I like to talk with friends about things I've read. | Almost always | Often | Sometimes | Seldom | Almost never |
| 8. On my own I read comic books. | Almost always | Often | Sometimes | Seldom | Almost never |
| 9. Reading is an important way for me to learn about the world. | Almost always | Often | Sometimes | Seldom | Almost never |
| 10. Reading helps me understand myself. | Almost always | Often | Sometimes | Seldom | Almost never |
| 11. A student who reads will get better grades than a student who doesn't. | Almost always | Often | Sometimes | Seldom | Almost never |
| 12. I prefer reading to writing. | Almost always | Often | Sometimes | Seldom | Almost never |

13. In a typical week, how much time do you spend reading outside of school?_____

# Appendix 3

# Student Evaluation Questionnaire

Student Name_____

**How Do You Like Using Telemail?**

Please circle one answer for each question.

1. Did you like writing private letters to other students?

Liked it very much
Liked it some
Did not like it

2. Did you like reading private letters from other students?

Liked it very much
Liked it some
Did not like it

3. Did you like sending messages to the bulletin board for everyone to read?

Liked it very much
Liked it some
Did not like it

4. Was working on the second draft of your story more important to you because other students were going to read your stories?

It was very important
It was a little more important
It did not matter

5. Did you like reading other student's messages on the bulletin board?

Liked it very much
Liked it some
Did not like it

6. What did you like about sending and getting messages?

# Appendix 4

# Teacher Evaluation Questionnaire

Student Name_____

**Please answer the following questions according to your perception. Circle the most appropriate response.**

1. With participation in the Project did the student's SKILLS IN READING improve more than would have been expected if the student had not participated in the Project?

Yes
No
Not Sure

2. With participation in the Project did the student's ATTITUDE TOWARDS READING improve more than would have been expected if the student had not participated in the Project?

Yes
No
Not Sure

3. With participation in the Project did the student's SKILLS IN WRITING improve more than would have been expected if the student had not participated in the Project?

Yes
No
Not Sure

4. With participation in the Project did the student's ATTITUDE TOWARDS WRITING improve more than would have been expected if the student had not participated in the Project?

Yes
No
Not Sure

5. With participation in the Project did the student's SELF- CONFIDENCE improve more than would have been expected if the student had not participated in the Project?

Yes
No
Not Sure

6. With participation in the Project did the student's INTERACTION WITH OTHER STUDENTS/TEACHERS improve more than would have been expected if the student had not participated in the Project?

Yes
No
Not Sure

7. Has participation in the program contributed to progress in other academic areas?

Yes
No
Not Sure

8. Please add specific comments and/or anecdotes about this student's participation in the Project.

# Appendix 5

# Holistic Anchoring Sample

## Level 1.0

YOU HOW ARE FINE
I AM FEEL AND FINE
I AM HERE XXXXXXXXXX SCHOOL IN FOR DEAF
WHERE LIVE XXXXX (NAME)
I IS NOW 9 GRADE
I AM 16 OLD
WHEN BIRTHS OCTOBER 1, 1970
YOU DO GOING WHERE SCHOOLLIVE
YOU DO ARE HEARING OR DEAF
I AM LIVE IN XXXXXX (TOWN)
I DO NOT HAVE WHERE TYY
LATER WAIT WILL BUY LONG TIME NEW TYY
YOU SEE LATER
BYE BYE

## Level 1.5

HI
HOW ARE YOU
I GOT YOU LATER
I AM WAITX FREESTYLIN FOR LONG TIME
I HOPE I WILL GET FREESTYLIN SOON
ARE U GET FREESTYLIN FOR YOURSELF
BYE
XXXXX (NAME)

## Level 2

HELLO
I AM HERE TO TELL YOU HOW HAPPEN THIS TELEMAIL
SO YOU MUST BE CAREFULR WITH YOUR TELEMAILAND
AND IF YOU HAVE ANY PROBLEM WITH YOUR TELEMAIL AND COME TO
ASK ABOUT IT
AND DO YOU WANT TO KNOW HOW I FIX IT
SO I FIXED WITH THIS
SO IF YOU SEE UPPER CASE MUST STAY WITH DOT
AND OTHER NAMES ON LINE MUST STAY WITH DT TOO AND OTHER TOO
IS LOCAL COPY NOT STAY WITH DOT
LOOK AT ABOVE OF THE NEAR THREE LIGHTS
SO YOU WILL NOT GETTING PROBELM
OK
IF YOU STILL DISGUST WITH THIS
THANK YU VERY MUCH FOR YOU COOPERATIONS
LOVES
XXXXX (NAME)
XXXX XXXXX (NAME)

## Level 3

I AM UPSET
MMI MY MOTHER CAME TO SCHOOL
SHE SAID I DID GOOD IN SCHOOL
BUT ANGIE TOLD ME SHE HAS TWO BOYS FRIENDS I AM SAD

## Level 3

HI
MY NAME IS XXXXXX XXXXXX (NAME)
I AM FEMALE
I GO TO XXXXXXX FOR THE DEAF IN XXXX XXXXX (SCHOOL-LOCATION)
I AM 14 YEARS OLD
I WILL TELLYOU ABOUT MY SELF
LET US SEE
I AME WHITE
I HAS LONG HAIR AND WAVY
I AM TALL
I AM ITALIAN AND AMERICAN
MY FAVORITE SUBJECTS ARE MATH SCIECE AND COMPUTER
MY FAVORITE SPORTS ARE VOLLEYBALL AND CHEERLEADER
I LIVE IN XXXX XXXXXXXX (TOWN-STATE)
I HSHAS BEEN IN MASSACHUSETTS
AND IT WAS NICE TO GO THERE AGAIN
MY FAVORITE STATE IS FLORIDA TOO
I REALLY LIKE MY SCHOOL BECAUSE I LEARN A LOT OF THINGS IN HERE
I AM VERY GLAD TTHAT I GOT YOUR LETTER
I GOT TO GO
I AM SORRY FOR MAKING A LOT OF MISTAKES ON YOUR LETTERS
WELL IT IS FUN TO WRITE A LETTER
RIGHT
PWB* (*PLEASE WRITE BACK)
YOUR FRIEND
XXXXXX (NAME)

## Level 3

I HAVE BEEN OUT WORKING IN THE WORK STUDY PROGRAM FOR OUR SCHOOL
I DO NOT GET TO WRITE TOO MUCH
I WORK VERY HARD ALL DAY LONG
AT NIGHT I DREAM ABOUT WORK
I DREAM ABOUT ALL THE OLD PEOPLE

## Level 4

HI SHIRLEY
HI
THIS IS ME XXXXXXX XXXXX (NAME)
I AM BACK TO SCHOOL AGAIN
I AM NOW A SENIOR
I CAN NOT BELIEVE THAT
PRETTY SOON I AM OUT OF SCHOOL AND DOING A LOT OF WORK IN COLLEGE
OR WHATEVER
HOW ARE YOU DOING
I AM DOING FINE
TODAY IS MONDAY SEPTEMBER 22ND
TODAY IS A HAT DAY
THE STUDENTS ARE SUPPOSED TO WEAR HATS NICE OR WEIRD ON
THEIR HEADS
BUT APPARENTLY NOBODY ARE WEARING A THING
NEITHER DID I
BUT TOMORROW IS FLOWER DAY
THAT MEANS A BOY OR A GIRL BUYS A FLOWER AND GIVES IT TO THEIR

SWEETHEARTS
WELL THERE IS A BOY I LIKE A LOT
HIS NAME IS XXXXX
I THINK HE LIKES ME TOO
WHO KNOWS HE MIGHT BUY ME A FLOWER
MAYBE HE WILL
MAYBE NOT
LIFE IS PRETTY GOOD NOW
I AM GLAD THAT LAST YEAR IS GONE FOREVER CAUSE IT WAS NOT
A VERY EXCITING YEAR
AND NOW THIS YEAR IS PRETTY GOOD SO FAR
I AM APPLYING TO NTID FOR COLLEGE
I WILL APPLY FOR GALLAUDET TOO JUST TO SEE IF I AM ACCEPTED
I WANT TO GO TO NTID REAL BAD
OH IF YOU DO NOT KNOW WHAT NTID IS IT IS NATIONAL TECHNICAL
INSTITUTE FOR THE DEAF
IT IS A COLLEGE FOR THE DEAF PEOPLE
HEARING PEOPLE GO THERE ANYWAY
IT IS IN ROCHESTER NY FOUR HOURS WEST FROM XXXXXX WHERE I
AM LIVING
WELL THE TWENTY MINUTES ARE UP
AND I HAVE TO DO SOME COMPUTER THING
YUCK
WRITE BACK SOON
BYE FOR NOW
XXXXX XX (NAME)
PS
WHEN YOU SEND YOUR LETTER TO ME PLEASE MAIL THEM TO XX (MAILBOX)
THANKS
I HAVE MY OWN MAILBOX IN CASE YOU ARE WONDERING

## Level 4

HELLO XXXX (NAME)
THIS IS XX (NAME) YOU LONG TIME OLD PENPAL
I HOPE YOU ARE STILL MY PENPALO
AND I WOULD LIKE NEW PENPALS IF THERE ANYONE WHO ARE INTRESTING
TO BE ONE
LIKE YOUR FRIENDS
WELCOME BACK
AND SUMMER IS OVER
HOW WAS YOUR SUMMER
MYY WAS PRETTY GREAT
I OPE YOU ARE STILL OUT THERE AND BE ABLE
TO BE MY PENPAL AGAIN THIS YEAR
LET ME KNOW IF YOU ARE STILL THERE
THEN I COULD WRITE YOU MORE NEXT TIME I HEAR FROM YOU
OK
SORRY THIS LETTER IS SHORT
BUT I DO NOT WANT TO WSTE MY TIME WRITING A LONG LETTER WITHOUT
KNOWING IF ARE YOU STILL THERE OR NOT
I HOPE I WILL HEAR FROM YOU SOON
BYE FOR NOW
LOVE
YOUR LONG TIME PENPAL
XXXX XXXXXX

## Level 4.5

HELLO
MY NAME IS XXXXXX XXXXXX (NAME)
AN I AM FROM XXXXX HIGH SCHOOL
IT IS A PUBLIC SCHOOL
AND I AM IN TWELTH GRADE

I LIVE IN XXXXXX XXXXX (TOWN-STATE)
I AM CURIOUS ABOUT CLARKE SCHOOL
I HEARD IT IS AN ORAL SCHOOL
WHAT ARE YOUR NAMES
WHAT GRADE ARE YOU IN
I WILL BE APLYING TO NTID
WAT ABOUT YOU
IF YOU KIDS WANT TO HAVE PENPALS WRITE TO X XXXXXX (TEACHER)
AND SHE WILL GIVE THEL LETTERS TO THE KIDS HERE
AND THEY WILL WRITE TO YOU FROM THEIR MAILBOXES
XXX XXXX IS MY TECHER FOR THE DEAF
AND SHE IS REALLY A NICE PERSON
I WOULD LIKE A PENPAL SO I WILL TELL ABOUT MYSELF
I HAVE ONE SISTER WHO IS HARD OF HEARING
SHE DOES NOT GO TO MY SCHOOL
BUT SHE GOES TO A HEARING SCHOOL
AND SHE ENJOYS IT
MY SCHOOL IS HEARING TOO
AND I ENJOY MAKING HEARING FRIENDS
BUT I LIKE MAKING FRIENDS WITH THE DEAF
I DO NOT HAVE ANY PETS
WAT ABOUT YOU
I LIKE PLAYING SOFTBALL
AND I AM TRYING OUT FOR THE VARSITY TEAM THIS SPRING
AND I HOPE I WILL MAKE IT
AND ALSO I WILL BE PLAYING THE FLOOR HOCKEY TOO
WHAT IS YOUR FAVORITE TEAM OF BASEBALL
SINCE THAT YOR SCHOOL IS IN MASSACHUSETTS
SO I ASSUME THAT BOSTON RED SOX MUST BE YOUR FAVORITE
AND IT IS MY FAVORITE TOO
TOO BAD THEY LOST IN A CHAMPINAOINSHIOP LAST NIGHT AGAINSIT THE ANGELS
HOPE THEY WILL MAKE IT IN WORLD SERIES
WILL I HAVE TO GO NOW
AND I HAOP I WILL HEAR FROM YOU SOON
IF ANYBODY WATS A PENPAL TELL XXX XXX BY WRITING TO HER
HER MAILBOX OF MINE
XXXX XXXXX (NAME)

## Level 5

HELLO EVERYONE
WELCOME BACK TO SCHOOL
AND SUMMER IS OVER
MY NAME IS XXX XXX (NAME)
AND I AM 18 YEARS OLD
I AM ATTENDING TO A HEARING PUBLIC SCHOOL XXXX HIGH
I AM IN SENIOR YEAR
I HAVE A HERING BROTHER XXXX 21 AND A HEARING SISTER XXXX 15
AND ALSO I HAVE A HLAF SISTER XXXX 8
HEARING ALSO
I AM THE ONLY DEF KID IN MY FAMILY AND RELATIVES
I HAVE TWO CATS XXX AND XXX AGES 15 YEARS OLD
I AM LOOKING FOR A PENPAL OR PENPALS ANY AGES BOYS AND GIRLS
I LIKE TO PLAY A LOT OF DIFFERENT SPORTS ESPECIALLY
HORSEBACK RIDING CROSS COUNTRY RUNNING
AND I WOULD LIKE TO PLAY FOOTBALL INT HE FUTURE
IF YOU WOULD LIKE TO WRITE TO ME THEN PLEASE WRITE
TO XXX XXXX MY MAILBOX
I HAVE TO GO NOW
AND I AM HOPING THAT ANYONE OUT THERE IS INTERESTING BEING
MY PENPAL

HAVE A NICE DAY
YOUR NEW PENPAL
XXX XXXX (NAME)

## Level 6

XXXXX (NAME)
HELLO
WANNA HEAR ABOUT THE MOCK TRIAL
MY TEAM PLAYED LAWYERS AND WITNESSES
AND THE TEAM FROM STREET SCAMEDY H.S.
PLAYED THE SAME THING
BUT MY TEAM WAS THE PLAINIFF
AND THE OTHER TEAM PLAYED DEFENSE
THE TRAIL WAS ABOUT A MAN WHO BROUGHT UP
THE LAW SUIT AGAINST THE OWNER OF THE
CONSTRUCTION COMPANY BECAUSE HIS SON
FELL OFF THE NEW PORCH WHICH IT COLLAPSED
AFTER IT WAS BUILT BY THE COMPANY
THE WEEK WENT BY
AND WE PLAYED AGAIN
BUT THAT TIME WE PLAYED AGAINST JOHN F. KENNEDY H.S.
AND WE LOST
WE ARE NOW OUT OF THE TOURNAMENT
OH WELL
IT WAS FUN ANYWAY
I GOT TO GO NOW
BYE
XXXXX (NAME)

# Appendix 6

# Charts A-D: Odell Material Used for Features Analysis

## Chart A.

### Linguistic Cues to Reference to Time Sequence

*Sequence or Temporal Reference.* Text denoting the passage of time or that an event occurred at a specific time, before or after another event indicates the writers' understanding of time sequence. Odell provides the following clues (p. 120) Adverbial elements indicating that something existed before, during, or after a moment in time. For example:

| | | |
|---|---|---|
| then | later | previously |
| when | meanwhile | earlier |
| next | subsequently | at that moment |

Linguistic clues to reference to logical sequence:

1. Words implying a cause-effect relationship. For example:

| | |
|---|---|
| because | since |
| therefore | consequently |

2. the phrase *if...then...*

# Chart B.

## Linguistic Cues to Physical context

*Physical Context.* Odell gives the clues for this reference (p. 119). Nouns that refer to a geographical location (e.g., the name of a city, a geographical region, a point on a map), an object in a physical setting (e.g., a house or tree), a sensory property of a physical setting (e.g., the sound of wind in the trees)

# Chart C.

## Classification

Classifying or grouping means putting like things together physically, or in mental imagery. X is *like* Y and Y is like X indicates that X and Y share common attributes. (Odell, p. 118)

1. Syntax

Sentences in which a linking verb joins a subject with a predicate nominative. (my assumption here is that one of the noun phrases, either the subject or the predicate nominative, labels the other; that is, one of the noun phrases suggests a more general class, of which the other noun phrase is an instance or example.)

2. Use of Phrases

| | |
|---|---|
| for example | for instance |
| an example | an instance |

3. Lexicon

Noun verbs, adjective and adverb forms of such words as *similar, resemble,* and *class*, and their synonyms.

# Chart D. (Odell, p. 113)

**Linguistic cues to use of contrast:**

1. Connectors

| | | |
|---|---|---|
| or | but | instead |
| nor | however | though |
| else | nevertheless | although |
| lest | on the contrary | in spite |
| otherwise | on the other hand | despite |
| alternatively | | |

2. Comparative and Superlative Forms

| | | |
|---|---|---|
| more/most | less/least | -er/-est |

3. Negative

| | | |
|---|---|---|
| no | without | none |
| not | nothing | |

4. Negative Affixes

| | | |
|---|---|---|
| anti- | il- | un- |
| - | dis- | non- |
| i- | -less | a- |

5. Lexicon
Noun, verb, adjective, and adverb forms of such words as *contrast*, *paradox*, *distinction*, *difference*, and their synonyms.

# Appendix 7

# Coding Sample

## List of Functions for Coding

1. Reporting and describing personal facts.
2. Openings and closings.
3. Reporting and describing general facts.
4. Requesting personal information.
5. Directing and suggesting.
6. Explaining or justifying.
7. Reporting opinions.
8. Predicting.
9. Requesting opinion.
10. Wishing or hoping.
11. Thanking or appreciation.
12. Evaluating.
13. Requesting opinion.
14. Requesting general information.
15. Complaining.
16. Apologizing.

## List of Features Used for Coding

1. Time or sequence.
2. Physical context or location.
3. Classification.
4. Contrast by comparative.
5. Contrast by negative.
6. Contrast by comparative and superlative.

# Appendix 8

# Sample Booklets for Teachers

## General Outline of Booklets

**Booklet 1: Reading and Writing Telecommunications**

Provides a general introduction to the Project plus an outline of all of the booklets contents.

**Booklet 2: How the Project Fits In With Your Existing Curriculum**

Describes how to incorporate the Project into your existing curriculum while emphasizing that the Project is itself not a curriculum.

**Booklet 3: What teachers Need to Do First**

Lists what you must do in order to prepare for both the hardware and the students' use.

**Booklet 4: How to Use DCI Deafnet**

Explains in detail how to set up the hardware, learn to use the terminal, and prepare the hardware for students' use.

**Booklet 5: Getting the Student Started**

Describes how to teach/explain to the students how to use the terminal. This is done is two ways: visual presentation and actual hands on use.

**Booklet 6: Preparation and Revision of Bulletin Board Entries**

Explains how Bulletin Board entries are prepared and revised through the use of Dialogue Journal-type exchanges.

# Booklet 1

## Reading and Writing and Telecommunications

This research Project has been designed to seek solutions to a central problem in the education of handicapped children, their limited ability to read and write. The researcher has developed a conceptual model that combines and brings to bear on this problem two major areas or recent developments in technology and theory. The Project model utilizes electronic communication in a way that is consistent with current theory and practice in literacy development as an interactive process.

**Theoretic Rationale**

The literacy as an interactive process approach to reading and writing is based on the assumption that literacy is communicative competence in using written language. This means competence in the personal and social use of reading and writing as well as the form. The approach involves both comprehending written information and expressing one's experience and intentions in writing to accomplish personally meaningful goals. Student's self-selected topics are used rather than assigned ones and the purpose is always to communicate and understand, never to evaluate.

Principles of modern composition theory state that the acquisition of literacy is possible only when students are given a supportive context wherein they are communicating something they really want to say to someone who genuinely wants to hear it, and when students are receiving constant feedback to monitor their attempts to convey meaning. An electronic network offers students the opportunity to pursue the acquisition of literacy in these ways by enabling them to write to an audience interested in what they have to say and to receive immediate space and direct feedback about their written communication.

The electronic network provides students with an interested audience of other persons and thereby creates a public forum via Electronic Mailbox letter writing and an Electronic Bulletin Board for the exchange of experiences, the posing of questions, and the testing out of language. By providing students with supportive adults who want to exchange meaning with them via letters as well,

the network allows the means by which requests for clarification and elaboration can be directly rendered. Most important, the network offers students a more diverse linguistic community than that presently afforded them within classroom environments. This creates a real motive for sustained reading and writing practice. Since these capabilities form the foundation for and are prerequisites to the development of literacy, the network provides the means by which students could make strides in the pursuit of literacy.

**Types of Input to Students**

There are two related kinds of input to students in the Project (1) telecommunications, and (2) interactive approach to literacy. Telecommunications are used both to send private messages to individuals and send public entries to an electronic Schools Bulletin Boards.

**Telecommunications**

1. Individual Mailbox for private correspondence

Individual Mailboxes are for sending and receiving private messages with other students. Students are to do this on their own except for technical assistance on your part (some assistance with composition may also be required by those students with low reading levels).

2. Electronic Schools Bulletin Board for Public Messages.

The Bulletin Board is for sending public messages. Students get assistance in preparing their Bulletin Board entries and reading those of others.

Students can sign in at any time to send or receive individual messages or to send or receive Bulletin Board messages. As with the rest of the Project, you should alter the Project to fit the student so that if a student has a very low reading level than he should not be expected to use the Bulletin Board.

**Interactive Approach to Literacy**

The other input is your establishing an environment in the classroom that fosters meaningful interaction through writing and reading. The major activities to accomplish this will be focused around your helping students in preparing and revising their Bulletin Board entries. This would be done (1) through live student discussions with you and peers, and (2) through Dialogue Journal-type exchanges with individual students to help them revise their drafts for Bulletin Board entries.

1. Live Discussions.

The objective for the live discussion is to assist students in communicating what they want to say to others on the Bulletin Board. These discussions help the student know that writing is a way of communicating what it is they want to say. The discussions could be between you and your students, or your students with each other.

Live discussions occur at two different times: before the student has written a first draft and then after the student has written it.

2. Written Discussions between Teacher and Individual Student.

After the student has written his first draft you assist him in revising his draft in order to communicate more clearly in writing the meaning he wants to express in his Bulletin Board entry. The written discussions will be going on during the same general period of time as the live discussions about the students' first drafts.

**Types of Input to Teachers**

There are two types of telecommunications channels available to you: private Mailbox and Research Bulletin Board.

Your private Mailbox has the same purpose as your students' – to exchange private messages. The Research Bulletin Board, like Schools, is public but is only for teachers, consultants and staff to share thoughts and comments.

**In Summary:**

The two electronic systems for students use are the:

- Student Mailboxes for the private communication of messages between individual students.
- Schools Bulletin Board for the exchange of final drafts of students with higher reading levels.

The two electronic systems for your use are the:

- Teacher Mailboxes for the private communication of messages with other Project participants.
- Research Bulletin Board to share thoughts and ideas with other teachers, consultants and staff.

# Booklet 2

## How the Project Fits in With Your Existing Curriculum

The major purpose of this booklet is to provide you with guidelines that can help you plan to *INTEGRATE THE GOALS AND OBJECTIVES OF THE PROJECT INTO YOUR EXISTING INSTRUCTIONAL PROGRAM.* This Project is not a curriculum nor is it designed to take the place of your existing program.

The primary instructional goal of the Project is the utilization of up to date technology as a means of helping students acquire basic academic skills.

To fully take advantage of the instructional opportunities the Project provides there are some things you may need to consider.

First, there are some students who, because of the degree and severity of their handicap, may not be able to use the technology alone. For these students you have to be creative and utilize your clinical and material resources to modify and/or adapt the technology for the student.

Second, your current instructional program may not have academic objectives that match the "technology." That's OK! The technology is not an objective – literacy skills (reading, writing) are the source of your objectives. Use the technology as one of the ways to reach an objective.

Third, it is possible that you do not have academic objectives for some of the students in your class. For those students it will be necessary for you to take a chance and give the student the opportunity to try the technology. We anticipate that the novelty of the hardware will motivate the student to try the system. If this is so and you see that the student is interested in the technology you can develop academic objectives that are appropriate and practical for the student.

**The Student Can Learn By Utilizing The Technology**

Some of the more complex array of behaviors to learn are in the reading, writing, and communication areas. These areas are not only difficult to learn but complicated areas to teach. The more traditional teaching approaches have included workbooks, reading series, experience charts, and an extensive array

of teacher made materials. Please continue using these approaches, and incorporate telecommunications into your instructional repertoire. This will require planning. The following is a list of questions that should help you plan how to use the technology.

- Does the student have an annual goal and/or a short term objective that involves increasing the student's literacy skills?
- If yes, do you have to modify or adapt the objectives to utilize the telecommunication skills?
- If no, what type of objectives could you develop? Reading? Writing? Communications?
- Do you involve the students in group activities?
- Do your current group activities focus on an interactive approach to literacy?

- If yes, do you need to modify/adapt your activities to work towards telecommunication skills?
- If no, can you develop new activities?

Remember, place an emphasis on integrating the telecommunications into your existing program.

**Generating Objectives**

Based on the student's individual educational plan (IEP) you will need to work with the student's long and short term goals and objectives. If you are modifying a student's objective(s) or developing new ones we recommend that you follow the guidelines below:

- The objectives should be concise:

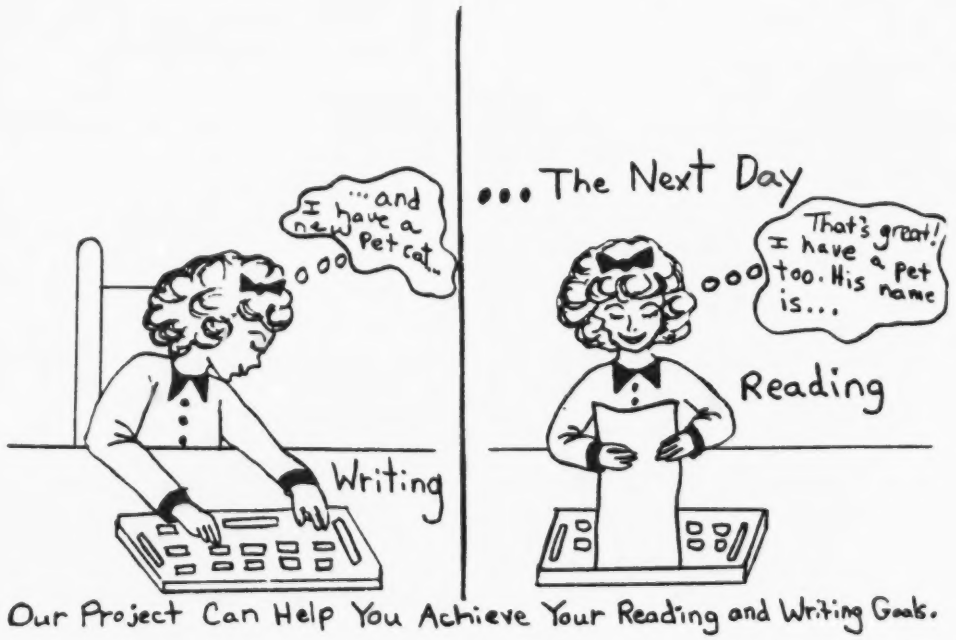
The student will send a written response to a message received within one school day.

- Objective should be realistic and specific to the student:

A student who cannot write in sentences should not be expected to send lengthy or complex messages.

- Objective should be reached through the use of telecommunications or classroom activities that enable the use of telecommunications:

If an objective for a student is to send a personal message, then one or two activities could be done. The first activity, a classroom group activity, could be designed to discuss topics that the student could use in their message. The second activity could involve the student having a "practice" telecommunication session where you help the student in the telecommunication process.


...and I have a new Pet cat...
Writing
...The Next Day
That's great! I have a Pet too. His name is...
Reading
Our Project Can Help You Achieve Your Reading and Writing Goals.

- Objectives should state how it will be monitored:

Student instructional assessment should include the monitoring of the student's performance on the targeted behavior as well as the method and materials used to instruct the student.

We realize that instructional integration is a complex process. The challenge is to use the technology to enable you to accomplish in a new and exciting way some of the things you are trying to do already.

# Booklet 3

## What Teachers Need to Do First

Before you and the students can begin to use the terminal there are three things that you must do in preparation. They are: (1) have your students select secret codewords, (2) coordinate with the teacher from your buddy school which students will write to whom, and (3) prepare for the actual use of the terminal. When you have completed these three steps you will be ready to use telemail.

**Selecting Secret Codewords**

In order for a student to gain access to the terminal the terminal will need to have three pieces of information from him: his name (User Name), his date of birth (Password) and his secret codeword (Codeword). Since his name and date of birth have already been chosen for him, the student need only select his secret codeword.

The secret codeword is what the student will use everytime he wants to get on to telemail so it should be something short and something he will remember. It could be a nickname (Fox), his real name (Steve) or something he likes (cars). As its name implies, the word is to be secret - something that only you and the student will know. After the student has selected his secret codeword, you will record it in booklet 4 under "Record of Passwords and Secret Codewords" for future reference (remember that you will also need to select a secret codeword for yourself).

**Coordinating with Buddy School**

Each school will have a buddy school. What this means is that each student at every school will be "teamed up" with a student at another school with whom they will begin a correspondence. It will be your responsibility to get in touch with the teacher from your buddy school (you will find out who this is shortly by mail) to decide which students from your school will be paired up with which students from their school. This could be decided according to where the students are on both reading levels and on interest levels ("One of my higher reading level students loves ballet and horses - do any of your students?")

The buddy system will provide at the start of the Project that students get answers to their messages and not become discouraged. Instead of having students arbitrarily write to one another they will already have a pen pal with whom they can begin to learn about corresponding, the technology and each other. This does not mean, however, that students should be discouraged from writing to other Project participants. After a correspondence has been established the student is welcome to write to other students (you will receive a list of the names of Project participants).

When actually organizing the initial correspondence with the other teacher, there are a few things to keep in mind. The first is that the number of students at your schools may not be the same. In order to remedy this, have the more capable students at the school with more students write to more than one pen pal. This way no one will be left out which is the reason behind the buddy system. The second thing to keep in mind is that half of the students at your school and half of the students at your buddy school should begin the correspondence. The rationale being that it will be less work for both teachers if they each only

HANDS ON EXPERIENCE

have half of their students getting on at first and also that both classes will be excited about receiving new mail.

The only thing that now remains is getting the terminal itself ready to be used.

**Selecting a Location**

Place the terminal(s) in a location that encourages frequent use. This spot should give students access during free periods, after school, as well as during class time. A major goal of the Project is that students will communicate by reading a lot. Hence, it is necessary that it be easy for them to send messages frequently.

The location you choose must be within the cord's reach of a telephone outlet. It does not matter whether you have pulse or rotary phone service. What is important is that it not be a busy line so that you and the students will not have to compete for online time with others in your school.

**Setting up the Area**

In addition to a desirable location it is also important for the area surrounding the terminal to be set up.

Post the illustrated posters provided by the Project which explain step by step how to gain access to the system. These are designed as references to be used by the student (and teacher) as needed so it is important that they are clearly visible.

**Preparing the Hardware for Use**

In addition to needing a desirable set up the terminal also needs electricity and phone line access. These next few steps explain simply how to connect the terminal for this access.

- Place the terminal on a table in the chosen area.
- Turn the terminal backwards so that the keyboard is facing away from you and you are viewing the terminal from behind.
- Plug the telephone cord clip into the second hole on the right labeled "Wall"; plug the other end into your wall phone connection.

- Plug the small adapter piece into socket on extreme left; plug the large adapter piece into a three prong wall outlet.
- Turn the terminal around so that it is now facing you again.
- On upper right hand corner of the terminal, switch "Upper Case" and "On Line" to the right and "Local Copy" to the left.
- Turn power on (back right hand corner - switch from "0" to "1").
- The terminal will print 707, indicating all is well.
- [For those schools programming their own cartridges, the terminal is now ready for you to do so. See the supplemental enclosure, "Programming The Passwords."]
- Turn the terminal off.

# Booklet 4

## How to Use DCI Deafnet

The following guidelines were developed by Brenda L. Moene, Director of International Communications Limited.

**How to Use DCI Deafnet**

You're finally all set! You've already done the first thing needed in preparing to use the terminal and that is to set it up. Don't be fooled by its "high tech" appearance -- it is a fantastic machine that can perform impressive feats. However its beauty lies in its ease of use.

**How to Get On**

What follows are the steps you will use *everytime* you want to use the Model 707 terminal to get into DCI Deafnet to check both your private Mailbox and the public Bulletin Boards.

1. Press CMD key
Response is: ?

2. Press D
Response is: Dial (Enter Name or Number) *

3. Type in your secret code word and RTN
Response is: 6206000

4. After the terminal is finished dialing (indicated by a light or beep sound) press the RTN key two times

5. You will be notified of new mail on the Bulletin Boards (Schools, Research, Deafnet) and the private mail you have received in your private Mailbox. It will look like this:

Welcome to Telenet's TELEMAIL service!
TELEMAIL is registered in the U.S. Patent and Trademark Office.
Copyright Telenet 1980-1986.

Your last access was Thursday, Aug 21, 1986 2:54 PM EDT
Today is Wednesday, Aug 27, 1986 12:01 PM EDT

CHECK these bulletin boards
DEAFNET
RESEARCH
SCHOOLS

Command?

Now you may choose whether you would like to read your mail or check the Bulletin Boards.

**How to Check Mailboxes**

1. To read messages left for you in your Mailbox after the Command? promp you type R (for Read) plus RTN. This will read all of your messages to you in the order in which they appear. To use the example cited above, after typing R and RTN and you would see the B.L.Monene message and then the D.W.Naiman message.

Command? type R (for read) and [RTN] (press the RTN key)

Subj: What's Up

Hi! Haven't spoken to you for a while and wanted to say "Hello". Hope you had a good summer. Brenda

Action?

Press the RTN key to read the message from D.W.Naiman

2. Should there be several messages and you only want to read a particular one (or a few), you type R and the number that appears next to the message on the left. Using the same example as above, if you wanted to only read the message from D.W.Naiman, you would type

R2 and RTN and it would skip over the first message from B.L.Monene. You could then go back later if you wished and read the other message(s) from B.L.Monene by typing R1.

Command: R2 [and RTN]

Susie...I am very excited that school is starting again in a few weeks. It will be nice to be involved with the students and teachers again. Doris

Action?

3. After the message is printed, the word Action? will appear. You will then press the RTN key which will give you the Command? prompt again.

Action? [RTN]

Command?

Having checked your Mailbox you move on and check the Bulletin Boards.

**How to Check Bulletin Boards**

1. To read messages posted on the Bulletin Boards you begin again with the Command?. After receiving this prompt you indicate which of the Bulletin Boards you want to check (ie CHECK SCHOOLS [RTN]). You will then type SCAN [RTN] which will list the new mail on the Bulletin Board for you. Here you select what you would like to read from the Bulletin Board by typing either R [RTN] for all of the messages or R plus the number you would like to read (R3 as in example give below) [RTN].

Command? CHECK SCHOOLS [RTN] (or RESEARCH -- you must indicate one of these)

Board Catalog

Command? SCAN [RTN]

Command? R3 [RTN] (remember you can go back and read the other messages later if you like)

HI THERE!
I JUST WANTED TO KNOW IF ANYONE HAD ANY SUGGESTIONS ABOUT WHAT I COULD BE FOR HALLOWEEN THIS YEAR. I HAVE BEEN CASPER FOR 7 YEARS NOW AND WOULD REALLY LIKE A CHANGE! THANKS.
-SIGNED YOUR FRIENDLY GHOST

Command?

2. Once again you find yourself with a Command?. On the Bulletin Boards you can only read messages, you can not compose. You now have two options: to quit by typing R [RTN] or to return to your own Mailbox. To get there you type CHECK [RTN] which takes you out of the Bulletin Board and puts you in your own Mailbox.

Command? CHECK [RTN]

Your own catalog.

Command?

3. Here you have the same two options: to quit for now by typing BYE and RTN or to compose responses to messages. The first would look like this:

Command? BYE [RTN]

This mail session is now complete.

GTE MAIL DISCONTINUED 00 40 00:00:06:54 41 11
(And of course, turn of the machine)

The following section will explain how to Compose and send a message.

**How to Prepare a Message to Send Later**

1. The messages will be composed off-line using the Model 707, which means that you can take as much time as you like composing without worrying that you are occupying the phone line. After the message is complete you will send the message on line so that it may be read by others.

NOTE: It is extremely important that the machine be turned off when inserting the cartridge.

1. Turn machine on.

2. Press the CMD button
Response is: ?

3. Press the E key
Response is: Edit (0-5)

4. Press the 1 key
Response is: Enter: Name "
(type in a one word name for the message)

5. Press the RTN key

6. Now you are ready to type your message

7. After writing the message type a period alone on the next line and RTN

8. Press CTRL key and SHIFT key together and while holding them press the Q key
Response is: Done [and then]
Edit (0-5)

9. Press 0 (zero)
(the message is now saved and ready to be sent)
Response is: ?
(Note: The next four steps are the same as the first four of "How to Use Telemail")
10. Press the CMD key
Response is: ?

11. Press D
Response is: Dial (Enter Name or Number) "

12. Type in your secret code word and RTN
Response is: 6206000

13. After the terminal is finished dialing press the RTN key 2 times

14. Your terminal will now place you into your Mailbox and inform you of new mail on the Bulletin Boards and list any new personal mail you may have received since the last time you used the system. When you see the Command? type C Note (for students -- teachers will use COMPOSE instead).

Response is:
To: (type in name of person or Bulletin Board it is going to)

CC: (this indicates a courtesy copy which enables you to send the message to more than one person. Using the initial example, if you wanted to compose one response for both B.L.Monene and D.W.Naiman you do so here by typing their names as such: B.L.Monene,D.W.Naiman. Notice there is not space between the comma and the next name.)

Subject: (type in a short title for the message)

Text: (Here is where you are going to put the message you have just stored)

15. Press the CMD key and then the F key
Response is: File transmit: (enter Name)"
(type in the name that you gave the message above) and [RTN]
(you will notice that the line ready light will start blinking -- don't worry, it's supposed to)

16. You will see the message being printed and then off is goes!

17. When you have finished sending your stored messages you type BYE [RTN]. The messages that have already been sent will need to be erased so that there may be room for new messages. Read on to see how this is done.

### How to Erase Stored Messages

You may store several messages in the memory (about 3 pages), but to be sure you do not run out of memory spaces, erase the messages that you no longer need. To erase the messages:

1. Turn your machine on
Response is: 707

2. Press the CMD key
Response is: ?

3. Press E [RTN]
Response is: Edit (0-5)

4. Press 2
Response is: Delete: Name "

5. Type in the one word name that you have given the message [RTN]
Response is: Done and Edit (0-5)

You may now either shut off your machine or if you wish to place new messages in the memory: press 1 and follow the directions in the "How to Prepare a Message to Send Later" section.

**How to Edit a Stored Message (Optional)**

The focus of the project, which will be made very clear in the booklet describing Dialogue Journal-type exchanges, is on meaning and not on perfection of grammatical structure. There are still times, however, when you simply want to change something or when typographical errors are made. In these events, there are editing tools available on the terminal to change them. They are for you and those students for whom it would be appropriate.

Editing can be done immediately after you have typed a message or if you must save it and then come back to it at another time. The manual that came with your cartridge has detailed explanations of the commands needed to accomplish the corrections (sww pages 6-8, 6-9, 6-11) and a summary of the commands (page B-2). To edit a message immediately after of during composing the message for storage in the memory, use any of the commands needed to move around the message and make the corrections (refer to the pages in your Editing Buffer Cartridge Manual).

If you have stored your message and need to add to or correct it, follow these steps to retrieve it:

1. Turn your machine on
Response is: 707

2. Press the CMD key
Response is: ?

3. Press the E key

Response is: Edit (0-5)

4. Press the 5 key
Response is: Modify: Name "

5. Type in the one word you have previously given the message you are looking for.

6. You now have the option of renaming the message. To do that, press the RTN key.
Response is: .

7. Type in the new name and then press the RTN key. If you do not wish to change the name of the message hold the CTRL and SHIFT keys down and press the key.
Response is: The original name of your message will printed.

8. Press the RTN key
Response is: Nothing prints, but you have been placed at the first column of the first line of your message. Now you may use any of the commands listed in your Editing Manual to make your corrections or add to the message.

Notes:

IMPORTANT: All commands using the off-line cartridge require you to hold the CTRL and SHIFT key together and then to press a third key. So in the instance of *back spacing*, you would need to press all three keys simultaneously instead of just the CTRL key and the H key.

The cartridge memory is set up to require you to press the RTN key after 80 characters (including spaces). You will not be allowed to go to the next line while composing until you press the RTN key after 80 characters. To avoid frustration because nothing happens when you type, a good rule to establish is: Press the RTN key when the printhead reaches the set of 3 lights on your terminal (or the number 8 on the keyboard) as you type in or correct the message.

If you erase a RTN at the end of a line while you are editing your message, you cause that line and the next line to join. If that line is longer than 80 characters, the terminal will not leave that line until you press the RTN key somewhere in that line.

It is a good idea to print your message, after all the corrections, to see that it is just how you want it to be. To do this:

1. Hold the CTRL and SHIFT keys and press the B key. (This puts you at the beginning of your message.)

2. Hold the CTRL and SHIFT keys and press the key. Your entire message will now print.

3. When you have finished editing your message, be sure to save it again by: holding the CTRL and SHIFT keys and pressing the Q key. If you do not do this, your corrections will not be saved.

# Booklet 5

## Getting the Students Started

Now that everything is set up it is ready to be used by the students. Do you feel comfortable with the terminal? Don't be surprised if you find yourself shaking your head no to this question. You can't expect to pick everything up all at once. Nor can you expect the students to do so either. Your providing two kinds of experience for the students will help them get started:

(1) a visual presentation
(2) actual hands on experience.

Both of these are essential to conveying the idea of the Project to the student. The two kinds of experience are most effective when presented in tandem closely together in time – one right after the other during the same lesson. Because the Project is based on an abstract idea (exchanging messages with unseen persons), combining a brief explanation of the process with a chance to really try it out is the most effective way of conveying these difficult concepts. In this case it is easiest to learn by doing.

**(1) Visual Presentation**

Before the student actually gets on the terminal it is important for him to get the idea that there are messages being exchanged with other people far away.

1. Show the students the illustrated posters you have mounted on the wall above the terminal (see booklet #3, "Setting Up the Area") which convey the idea that messages are exchanged with people they can't see.

2. Supplement the posters by briefly explaining the nature of the Project. It is important to get across that there are two different kinds of messages that can be sent: public and private. The following is an example of what you might say to your students. It should be phrased in words you know would be appropriate to your students.

"This is a way to send messages to people far away. It is like a letter because after you finish writing your message you send it to someone far away. After the person far away reads your message he writes a note back to you. Then you can write another letter back to him and so on and so on. You can write secret messages that only you and the person far away can read. It is your private message.

You can also send messages that everyone can read. This message is not for just one person and is not private like the other one. This message is public, like a newspaper where that can be read by all [you may want to give an example by using a newspaper to demonstrate] and can be answered by anyone who reads it. It is not a secret."

After giving this brief explanation and answering any questions, you immediately move from the visual presentation to the actual hands on experience.

VISUAL PRESENTATION

**(2) Actual Hands On Experience**

This is the second phase of the learning process. Here the student actually has a chance to work at the terminal to get a first hand glimpse at what this is all about. It is important here that the student not become frustrated with the terminal or the procedures. Give him as much assistance as he needs at first (some students may continue to require assistance depending on their level of functioning). Do not expect the students to master the procedures on the first few tries or have full comprehension – once again, it is learning by doing that is the theory behind this Project.

Steps to follow in getting students on:

- Work one to one with the student.
- Follow the procedures for using the terminal that are posted on the wall above you to help the student get into the system. Remind the student of the password he has already selected and that you have already programmed (see booklet 3, "Programming Passwords").

- Have student read the letter you sent him.
- Have student compose a short answer off-line and send it.
- Have student write a letter and send it to another student from his twin school. If the student has very low reading and writing ability he should be helped with this, otherwise the letter should be composed independently.
- Have student read the notes posted by you and others on the Bulletin Board.
- Have student save the print-outs of all of his messages in the folder provided by the Project.

It is important that the student get on again within the next few days. It will help reinforce the idea that there is an exchange process going on and also reinforce his learning of the procedures. You should continue corresponding with a student until he receives a letter from another Project participant.

**Description of Electronic System Available Via Telecommuncations**

The students have access to two types of communication channels: Private Mailboxes and Bulletin Boards. They are different both in their audience (private or public) and in the preparation of the messages that are exchanged.

1. Individual Mailboxes for private correspondence

Students' individual letters will be sent and received entirely by themselves after they have learned to handle the equipment (some assistance may continue to be required by those students with very low reading levels). Part of the pleasure is in the private nature of the correspondence and students will say whatever they wish without your monitoring or knowledge.

Private messages are not to be polished efforts, but instead are letters that convey the students' desire to communicate with others. If possible, have each student sign in to the terminal to read and write private messages at least once a week.

2. Electronic Schools Bulletin Boards for Public Messages

Bulletin Board entries are to be worked on by both you and the student through Dialogue Journal-type exchanges in order to produce something that the student really wants to say to "the world." The students should have their own choice of topics – something they want to share with others. The idea here is that since the student is going public with his thoughts he will be motivated to participate in a revision process (see Booklet 5, "Dialogue Journal Exchanges"). This is unlike the Private Mailbox entries which is composed by the student while sitting at the terminal (again independent composition may not be feasable for low reading level students).

Since no one is ever excluded from participating in any aspect of the Project, we encourage all students who wish to submit stories to the Bulletin Board to do so. Use of the Bulletin Board however, may not be suitable for all students.

Those students with low reading levels may only be able to exchange private messages which will be on the appropriate level for them and they will not have to feel frustrated or overwhelmed. These students can write a simple thought or even a word – "Snow" – to someone else and thus participate in the exchange. On the other hand, those students with high reading levels may wish to use both the public and private forms of communication. Rather than having to confuse

the low reading level students, it may be easier to tell them only about private exchange so that they are not confused by the difference.

The objective here is for those students who use it to submit his own piece of writing to the Bulletin Board at least once a month. Students are also encouraged to write in to the Bulletin Board their reactions to the stories and other items sent in by peers.

3. Research Bulletin Board

The Research Bulletin Board is for teachers, staff and consultants. Like the Schools Bulletin Board it is a place to go public with your experiences and thoughts about the Project.

By now the students should have a pretty good understanding of what the Project is and how it works. The hardest part is over. Next comes working with the students preparing and revising drafts for Bulletin Board entries.

# Booklet 6

## Preparing and Revising Bulletin Board Entries

**Assistance in Preparing and Revising Bulletin Board Entries**

The Bulletin Board entries are to come from ideas the student selects, discusses and then works on with you. Because the messages are going public the students are motivated, with your help, to revise what it is that they want to say so that it is more easily understood. The Bulletin Board entries are not like the responses made on the Private Mailboxes which are composed on the spot. Instead, Bulletin Board messages involve a lot of teacher input in helping the student to develop and revise his message in order to more fully express what he wants to say. The input you provide comes in two modes: live discussions and written discussions.

Both the live and written discussions have the same purpose which is to help the student better communicate his message and to make his Bulletin Board entry a more integral part of where he is in his thoughts and feelings.

**(1) Live Discussion**

Live discussions serve primarily to assist the student with selecting a topic they would like to talk about on the Bulletin Board. Providing the students with an opportunity to discuss ideas they would like to share with others narrows the gap between verbal communication, which they are much more accustomed to, and written communication, which is less familiar and is usually about a topic selected by someone else which does not reflect individual interest.

The discussions could be between: you and a group of students, you and an individual student, groups of just students, etc. The discussions could be before any writing has taken place and again after students have written a first draft. The students could show their drafts to each other and get suggestions on what a reader of the Bulletin Board might need and want to know.

**(2) Written Discussion**

Written discussions occur in the form of Dialogue Journal-type exchanges. The philosophy and procedures of the Dialogue Journal-type exchanges are similar to regular Dialogue Journals, but here we are adapting the procedures to fit the special objectives of the Project. In the usual Dialogue Journal, writers are encouraged to communicate about any real concerns and issues. Here, using a Dialogue Journal-type exchange, the focus is on the meaning and intent of the student's first draft piece of writing for the Bulletin Board, and your comments and questions are focused more narrowly around this topic.

The Dialogue Journal-type exchange involves two individuals in ongoing writing in which each person responds to the message sent by the other. In the adaptation of dialogue-writing by this Project, the focus of the Dialogue Journal-type exchange will be on the ideas and clarity of meaning of the messages students write for the Bulletin Boards. It is desirable that your remarks go on another sheet of paper so that there could be a real discussion instead of simply corrections.

This exchange between you and the student will provide an opportunity for him, on an individual and private basis, to ask questions about his writing and explore a particular idea. Your responses to students will be designed to model language usage, request clarification of ideas, share personal thoughts and make extending critiques of writing drafts for the Bulletin Boards.

The Dialogue Journal-type exchange will be kept in a folder, provided by the Project, with the student's name on it. The student will put all of his drafts for the Bulletin Board in the folder. It is in the folders that the correspondences of the Dialogue Journal-type exchange between you and the student will be kept.

**Outline of Steps Used in Preparing and Revising Bulletin Board Entries**

Before beginning the process of preparing a Bulletin Board entry it is important that the student understand that this is a message that will be sent publicly. The fact that his message will be read by a large number of people is important in that it makes the student wish to engage in a revision process.

**Revision Process**

(1) Student writes first draft (this occurs after the student participates in the live discussions explained in the preceding section).

(2) You read and comment in writing about the draft written by the student.

(3) Student reads the comments you have made about his first draft, writes a response and returns his response to you.

(4) You read the student's response and make additional remarks.

(5) Student reads your comments and incorporates your suggestions into his second draft which he then writes.

(6) Student sends his final copy to the Bulletin Board.

The above is a suggested format for you to follow in assisting students in developing and revising the Bulletin Board entries. You could vary the procedures to fit each student's special needs but should include activities implementing both the live and written interventions. In the case of those students with particularly low reading levels, written exchange may not be feasible. Conversely, for those students who would like to engage in a more in depth communication process involving several exchanges, this would also be encouraged. It is for you to decide which type of revision process would be appropriate for whom.

**General Attributes of Dialogue Journal-Type Exchanges**

As mentioned, the Project is not using regular Dialogue Journal exchanges but Dialogue Journal-type exchanges. Some of the general attributes of dialogue-writing and the ways in which this Project will adapt them are:

- The writing is student-generated and teachers respond individually to students, accommodating to their reading and writing proficiency level.

The "take-off" point for the Dialogue Journal- type exchange writing is your response to the students' first draft of writing for the Bulletin Boards. The writing in the Dialogue Journal-type exchange from that point on is developed from their ideas and the shaping you do about their writing drafts.

- The writing is interactive.

Writing in a dialogue journal needs to be carried out on a regular basis in order for a relationship to be developed between the two writers.

For this Project, teachers are requested to allow class time for students to write their entry or work on revising their drafts.

- The regularity of student-teacher Dialogue Journal-type exchange writing is promoted by keeping all exchanges in a special folder for the activity and by asking participants to date each entry they make.

In this Project, your students will use a folder as described above. You and your students are asked to date each entry you make.

The writing is functional and non-threatening. Both parties to the writing focus on communication rather than form in their entries. Both you and the student write as participants in a conversation in which a genuine message is being communicated and avoid evaluating or commenting on the students' use of language.

In communicating with students through the writing in the Dialogue Journal-type exchange about the drafts students are writing for the Bulletin Boards, you are expected to focus on clarification of meaning and expansion of ideas. The emphasis will not be on evaluating, correcting or criticizing the language usage of the student. Although it is appropriate with some students to make certain corrections, others will be discouraged by this and will learn some of this through your modeling of good language.

You can see from this that you are expected to "model" language use as a means of shaping student writing, but not directly correct student writings in the Dialogue Journal-type exchanges.

- Privacy is a major attribute of Dialogue-Journal communications.

While the research staff reserves the right to use the entries for documentation of student growth in writing fluency, both you and the student may be assured that any writing kept in the Dialogue Journal-type exchange folder belong to participants and copies will be seen only for the purpose of analysis.

**Examples of Dialogue Journal-Type Exchanges**

After a student has introduced a topic of interest it is your role to help him elaborate on it and to add more information using a rich variety of language functions typical of correspondence. Transcribed excerpts are given below demonstrating aspects of communication such as complaining and warning, predicting and requesting.

**Complaining and Warning**

Randy: OK Be careful! Or I will gift to you a ticket like a fair's ticket and I am tired to do our work. I mean homework! do you want

Teacher: Randy - you make me laugh! No, I don't want a ticket. Thanks, anyway.
So you don't like homework, eh? Well, tell me why you don't like homework. I'm really interested in your opinion.

**Predicting**

Al: I can dance like Michael Jackson You will see me dance like Michael Jackson But I will go to trip in California and saw Michael Jackson.

Teacher: Yes, Al. I have already seen you dance like Michael Jackson. You sure do have some fine moves!
Will you really go to California soon OR do you wish you could go to California soon!

**Requesting**

Amy: Condo want you sleep on my condo know where is my condo's Road? Must you have map? I will Kiss to (teacher's name)

Teacher: I don't have the address of your condo. Do you want me to come to your condo?

As you can see from the preceding examples, the teacher's role in these exchanges is to help the student clarify for himself and the reader what it is he is trying to convey. The teacher is also responding "humanly" ("Randy - you make me laugh!") to comments made by the students in order to maintain the feeling of a written conversation.